THE POLITICS OF THE ENVIRONMENT: AN ANALYSIS OF STATE REGULATIONS AND SPECIAL INTEREST BEHAVIOR

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Why do some states pass strict environmental regulations, while others are content with the baseline standards required by the federal government? This dissertation seeks to answer that question by looking at the costs and benefits to a state from developing strong environmental standards. This work outlines the state environmental choice as a tradeoff between the desires of consumers (who want better environmental quality) and of producers (who want less restrictive environmental standards). A rational state legislator maximizes her chances of being re-elected by balancing these two competing forces when setting environmental policy. This dissertation provides empirical evidence that the differences in state standards for sulfur dioxide and toxic metals are a function of per capita income levels, special interest participation, strength of polluting industries, and natural differences in climate and location that inflate the cost of compliance.

Also explored in Chapter 5 of the dissertation is the degree to which special interest voter scorecards are representative of actual candidate positions on certain issues. An

analysis of a series of voter guides from the League of Conservation Voters and the Christian Coalition provides evidence that these organizations slant the reported positions of candidates by including non-issue partisan votes in the calculation of their scorecards. Including these peripheral votes allows the groups to increase the scores of their favored party members and decrease the scores of the opposing party.

CHAPTER 1
INTRODUCTION

State Environmental Regulations

The legislation of the 1970's, which includes the Clean Water Act and the Clean Air Act, provided the foundation for modern day environmental politics. Before this time, the protection of environmental resources had been primarily the responsibility of states. However, public concern over the lack of state responsiveness to environmental problems, along with a growing awareness of the externalities between states, led to federal intervention in this area.

In order to ensure citizen access to basic health and environmental protections, the legislation minimized state sovereignty over environmental policy. In particular, the Clean Water Act seeks to make all surface waters within the United States "fishable and swimmable." Likewise, the goal of the Clean Air Act is to limit the amount of airborne pollutants everywhere in the United States.

Although these laws are designed to provide equal protection to all Americans, they also recognize the important role of states in this process. Pollution control problems often require a detailed understanding of local industries, geography, and housing patterns. For this reason, states are delegated some authority under the programs to personalize their environmental agenda. For example, the Clean Water Act provides flexibility to states in setting standards for toxic metals, while reserving the right to reject regulations that do not comply with the national goals. The Clean Air Act allows states

to have stronger pollution controls but prohibits them from having weaker standards than those required nationwide.

The flexibility that these two laws provide to states poses a number of interesting empirical questions that I seek to answer in the following chapters. Do states select the stringent environmental standards favored by consumers or the more relaxed standards preferred by industrial polluters? Do states take advantage of favorable climate conditions by setting stricter environmental standards? Do relatively poorer states react differently to changes in income levels when setting an environmental agenda?

The likelihood a state will adopt a strong pollution control program is analyzed within Peltzman's (1976) theoretical model of group conflict. In the context of this work, a rational legislator will maximize political support by weighing the gain in consumer votes (from better environmental quality) against the loss in industry votes (from increased restrictions on firm activities). Also taken into account are the natural peculiarities across states that affect the cost of compliance with environmental regulations, such as geographic and climate conditions.

The existence of an inverted-U shaped curve linking state environmental standards and income is also investigated. This application of the inverted-U hypothesis asserts that the evolution of environmental regulations is essentially different at low and high levels of income. More specifically, income growth at lower levels will precipitate a weakening of environmental standards. However, beyond a certain point further increases in income will be associated with a strengthening of these same standards.

The results presented in this dissertation provide a valuable contribution to the literature addressing the inverted-U relationship between income and environmental

quality. Although the results of previous studies could have simply reflected lax enforcement of existing regulations, evidence provided in this work implies that low-income states actually choose weaker environmental standards.

Special Interest Participation

The final issue that will be addressed in this dissertation (Chapter 5) is the degree to which special interest scorecard rankings provide reliable estimates of consumer demand for social policies. These special interest voter guides rank a politician based on her behavior on a selection of "issue-specific" roll call votes. Although there has been no rigorous analysis of voter scorecards, economists often use these ratings in empirical work to proxy for consumer or legislator preferences.

The current literature does not address either the incentives that special interest groups have to manipulate these scores, or the extent to which this manipulation favors a certain political party. The main contribution of this chapter is to extend the literature by examining whether the inclusion of peripheral votes in issue-specific scorecards can be shown to provide evidence supporting the hypothesis of interest group bias. The incentive to misreport candidate behavior in favor of one party is examined within a standard voting model that addresses the decision by a group member on whether or not to vote in the current election.

This chapter examines two voting guides for partisan bias, specifically a series of congressional scorecards (1997-2001) for the League of Conservation Voters (environmental scorecard) and the Christian Coalition (religious scorecard). Once the voting guides are revised to exclude non-issue votes and to correct for methodological

inconsistencies, legislators fare better on opposing indices and worse on supporting indices.

The results from this chapter are used to construct a revised unbiased measure of the environmental liberalism of elected officials. This variable, composed of a four-year state average of the revised LCV scores, is used as an explanatory variable in the earlier two chapters. Although this measure provides only limited success in explaining the variation in state environmental policies, it nonetheless outperformed all other alternative measures that were constructed for this purpose. [1]

Plan of the Dissertation

A common theoretical model and literature review is outlined in Chapter 2 that will provide the foundation for the empirical investigations of Chapters 3 and 4. More specifically, Chapter 3 tests the Peltzman model with a newly assembled dataset of state toxic metal water quality standards, and Chapter 4 follows with a similar examination of sulfur dioxide air quality regulations. Chapter 5 develops an unbiased estimate of environmental liberalism of state elected officials that is used as an explanatory variable in the earlier chapters. This section is self-contained with its own literature review and theoretical component. Finally, Chapter 6 presents concluding remarks and summarizes the contributions and results of the dissertation.

[1] Other variables included a ten-year average of party identification of elected officials (state and federal), ADA scores, and original LCV scores.

CHAPTER 2
THE POLITICS OF STATE ENVIRONMENTAL STANDARDS

Introduction

This chapter provides the foundation for the analysis of state air and water quality standards. A review of the current literature on state environmental policy behavior is outlined, with specific references to the contribution of this work. Also provided in this chapter is the theoretical basis for the investigation, an application of Peltzman's (1976) model of legislative decision-making.

Literature Review

State Environmental Policies

The variance across states in environmental quality is intimately linked to the policy measures states employ to control these externalities. However, a study of the determinants of strong pollution control programs has been sidelined by the easier task of directly analyzing environmental quality outcomes across states. An understanding of the divergence among states in their willingness to adopt restrictive environmental policies provides an essential piece to the environmental puzzle, and neglecting this aspect will most certainly leave unanswered questions regarding state-level differences in environmental quality. Only two studies in the literature have provided a detailed focus on the environmental policy differences across states, and a discussion of their contributions is useful.

Lowry (1992) examines the divergence in state environmental programs by attempting to explain a number of general measures of state regulatory efforts. For air pollution control programs, the dependent variables include a ranking of State Implementation Plans (SIP's) as strong or weak, state air expenditures per capita, a ranking of enforcement programs from one to ten based on monitoring and inspections data, and finally the extent to which the state performs acid rain research. He compiles similar aggregate rankings of water quality programs to use as the dependent variable in those analyses.

However, none of these variables represent the actual standards in place within the states, and for that reason do not provide a clear and unbiased view of the differences in state responsiveness to environmental concerns. For example, the SIP's represent only a plan of action, while the level of state expenditures does not account for either how the money is spent or the degree to which this spending is efficient. This dissertation specifically addresses the problem by using state environmental standards as the dependent variable to be explained in the model.

Lowry has limited success in characterizing the variation in environmental policies across states with his chosen model.[2] However, he finds general support for the theory that states respond to pollution problems by setting more restrictive policies. More specifically, as the importance of polluting industries increases within a state, so does the likelihood that the state will respond with stricter environmental controls. These results are based on a specification that aggregates the industrial strength variable to include

[2] Independent variables in Lowry's model for air and water programs include: percent of state population living in excess SO_2 areas, manufacturing and utility sectors, personal income per capita, voter turnout and party competition, federal subsidies, EPA sanctions, and percent of state waters fishable or swimmable.

both the manufacturing and utility sectors as a percent of gross state product. However, aggregating the variable in this way ignores potential differences in pollution intensity and market structure across polluting industries.

For example, public utilities represent well over half of the sulfur dioxide emissions in the U.S., with private manufacturing firms coming in a distant second. This difference is compounded by the fact that public utilities represent a regulated natural monopoly in most markets, and do not face the same competitive forces as private industries. These two differences could potentially impact the development of state policy, and should be accounted for in the model. This paper addresses this concern by separating the variable for industrial strength into private manufacturing firms and public utilities.

Ringquist (1993) provides a second analysis of state environmental policy responsiveness. In this work, he summarizes various economic and political models that are designed to account for cross-state variation in environmental policy outputs, and develops a model that seeks to integrate these approaches. The dependent variable he uses to describe the variance in state policies for air and water pollution control programs ranks states from weakest (one) to strongest (ten or thirteen, depending on the program).[3] Among other characteristics, this ranking takes into consideration state differences in enforcement mechanisms, EPA sanctions, and environmental budget expenditures.

Ringquist finds similar evidence to suggest that states respond to an increase in the prevalence of polluting industries by setting more restrictive policies, although his specification excludes public utilities entirely. Other empirical results from the model include the observation that state dependence on fossil fuels decreases the level of state

[3] Ringquist's ranking is taken from the State of States: 1987, published by the Fund for Renewable Energy and the Environment (FREE).

responsiveness to environmental concerns, while an increase in the level of environmental activism (special interest participation in environmental organizations) increases the likelihood states will develop strict environmental programs.

This dissertation extends the analyses of Ringquist and Lowry by utilizing the actual standards as the dependent variable, instead of the expenditures and measures of the effectiveness of pollution control programs examined in their works. Since both the causes and effects vary with the pollutant studied, it is reasonable to assume that a ranking system ignoring these differences will be less successful on a case-by-case basis. Moreover, aggregating the dependent variable in this way makes it harder to test the theory, since it commingles the effects of regulations, enforcement, and initial conditions.

Environmental Kuznets Curve Application

The existing literature concerning the relationship between environmental quality and income is extensive. The controversial inverted-U hypothesis, also known as the Environmental Kuznet's Curve (EKC), posits that environmental degradation initially increases with economic development, but beyond a certain threshold level, increases in income are associated with better environmental quality.

For example, increases in income for a poor economy results primarily from industrialization, which leads to higher pollution levels. However, as an economy expands and grows richer, a structural change within that economy towards the service sector and away from heavy industry occurs. Changing voter preferences for environmental quality enhances this effect – the income elasticity of demand for environmental quality is relatively small at low income levels, but becomes larger as income increases.

Previous research concerning the identification of an inverted-U shaped curve linking income and environmental quality has produced conflicting results. [See, for example, Selden and Song (1994), Holtz-Eakin and Selden (1995), Kaufmann et al. (1998), Torras and Boyce (1998), List and Gallet (1999), and Dasgupta et al. (2002)]. The majority of these works have focused on estimating this relationship by means of a cross-country reduced form analysis. The most influential of these, a work by Grossman and Krueger (1995), examines this relationship with panel data from the Global Environmental Monitoring System (GEMS). Their research provides evidence to support the inverted-U hypothesis, and they suggest that the critical threshold level occurs at a GDP per capita of less than $8,000 (in 1990 dollars) for the majority of pollutants – Greece and Portugal are among countries at this income level.

Grossman and Krueger also emphasize that "a review of the available evidence on instances of pollution abatement suggests that the strongest link between income and pollution in fact is via an induced policy response" (371-372). However, surprisingly little research has been done to define this relationship. The contribution of this dissertation is to directly examine the impact of income on environmental regulations. If the results in the EKC literature reflect differences in environmental standards, then these standards would follow the same income path as environmental quality – standards initially deteriorate as income grows, followed by a strengthening of these same standards at higher income levels.

Theoretical Model

In a 1976 article, Peltzman outlined a theoretical model in which he proposes that a legislator will choose her policy stance in order to maximize electoral support. In the

context of this paper, a legislator will receive the greatest number of votes by taking into account both consumer and industrial concerns when setting environmental standards. Algebraically, a legislator will maximize the net majority voting for her (M) by optimizing the following equation:

$$M=W*F-L*A$$

where W = # of winners from industry due to looser environmental standards
= # of potential voters in industry and stockholders

L = # of losers from looser environmental standards
= # of consumers with no industrial ties

F = net probability that winner votes for legislator
= probability of favorable vote – probability of unfavorable vote

A = net probability that loser votes against legislator

For example, weak environmental standards will gain support from industry at the expense of consumer votes. Since a legislator wants to maximize the votes she receives, the first order conditions specify that this be achieved where the marginal gain of industrial votes is just offset by the marginal loss of consumer votes. In other words, support from industry and opposition from consumers will be equated at the margin.

This paper seeks to test the Peltzman theory by developing an empirical model that accounts for these conflicting interests. More specifically, greater levels of consumer opposition should result in more restrictive environmental policies, while the opposite effect will occur when large industrial interests are present in a state. A legislator also would be expected to take into account natural variations in the cost of compliance when setting an environmental agenda.

Conclusions

The following chapters build upon the existing literature of state environmental policy responsiveness to more effectively characterize the determinants of strong state pollution control programs. More specifically, Chapter 3 tests a newly developed database of state water quality standards for toxic metals, and Chapter 4 follows with an analysis of ambient air quality standards for sulfur dioxide. The theoretical foundation for both of these empirical investigations is an application of the Peltzman model of legislative decision-making.

The following chapters provide two major contributions to the economics literature. The first is to develop a set of dependent variables that represent the actual standards in place, and not the commonly used ranking systems of state policies. This specification of the dependent variable provides additional insight into the determination of individual policies, and to the broader implications that these policy results may have for similar environmental regulations. The other significant contribution of this work is to extend the inverted-U hypothesis to define the relationship between income and environmental standards. More specifically, I propose that standards initially deteriorate as income grows, followed by a strengthening of these same standards at higher income levels.

CHAPTER 3
THE POLITICS OF STATE WATER QUALITY STANDARDS

Introduction

Anthropogenic contamination of surface waters poses significant health risks to Americans, as 160 million receive their drinking water from this source daily. In 1972, Congress addressed the issue with the Clean Water Act (CWA), which outlined a clear objective "to restore and maintain the chemical, physical, and biological integrity of the nation's waters." It defined the "fishable and swimmable" goals of the Act, which "provide for the protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water" (Environmental Protection Agency, National Water Quality Inventory 3). Under this legislation, states are granted the autonomy to design and implement their own system of water quality standards, offering states a true choice between environmental quality and growth.

Since the Clean Water Act is one of the largest federal programs ever to delegate primary responsibility to states, a better understanding of how states have set their standards in this large program is especially important. This chapter performs an empirical analysis of a newly compiled dataset to both identify key variables in the decision-making process and test the hypothesis that states trade off idiosyncratic benefits and costs in setting environmental policy. This is the first work to compile the data necessary for this task, and consequently the first to attempt an explanation of the variation among states for this aspect of environmental policy.

The theoretical framework for tbis chapter is an adaptation of Peltzman's model on legislator vote-maximization, which guides the selection of variables used in the empirical analysis. Specifically, this chapter identifies the agriculture industry as a motivator for weak state water quality standards, while heavy industry does not play an integral role in the process. Certain state-specific environmental characteristics also prove significant, as they reflect the added costs of implementing stricter standards.

The existence of an inverted-U shaped curve linking state environmental standards and income is also investigated. This application of the inverted-U hypothesis asserts that the evolution of environmental regulations is essentially different at low and high levels of income. More specifically, income growth at lower levels will precipitate a weakening of environmental standards. However, beyond a certain point further increases in income will be associated with a strengthening of these same standards.

Water Quality Standards

Water quality standards are laws or regulations imposed by states to accomplisb the goals of the CWA, which are 1) maintain and restore the integrity of the Nation's waters, 2) protect aquatic life and provide recreation in and on the water, 3) prohibit harmful amounts of toxic pollutants from entering the waters, and 4) eliminate the discharge of pollutants to navigable waters.

These water quality standards are to apply to all surface water within the state and generally consist of three elements. The first is the *designated beneficial uses* of water bodies within the state. Typical beneficial uses include public water supply, propagation of fish and wildlife, agricultural and industrial uses, and recreation. The second element is the *antidegradation policy,* which ensures that waters that are already meeting the

minimum requirements will not be degraded below their current levels. The third element of water quality standards is the development of a list of *numeric criteria* that are necessary in order to protect the beneficial uses that have been designated within the state. It is this third category that will be examined here because it allows for a quantitative comparison of standards across states.

National Toxics Rule

The CWA requires the Environmental Protection Agency to periodically develop and publish revised numeric criteria for water quality. The National Toxics Rule establishes the water quality criteria that the EPA believes to reflect the most current scientific knowledge about the effects of toxic pollutants. It also establishes the maximum acceptable concentration levels that will generally be safe for human and aquatic life protection.

These recommendations do not reflect local considerations, such as natural variations in climate conditions and location or the economic impacts of meeting the proposed standards. For this reason, they are intended only to provide guidance for states in adopting their own set of standards.

The current National Toxics Rules for the metals studied in this work are listed in Table 3-1, along with the number of states that have adopted these recommended standards. Also provided in the table are summary statistics for the state metal standards, including the mean and standard deviations, and high and low values. With the exception of acute chromium III and chronic zinc, the average state standard for each of the toxic metals is above (weaker than) the EPA recommendation. However, most of the state averages are very close to the federal guidelines.

Table 3-1: Summary of Acute Toxic Metal Standards and National Toxics Rule*

Acute	Obs.	Mean	Standard Dev.	Min. Value	Max. Value	National Toxics Rule	# of states at NTR
Copper	45	17.43	4.03	6.25	30.21	13	0
Chromium III	40	1724.98	135.22	918.65	1803.8	1804	0
Chromium VI	43	17.28	7.20	15	60	16	18
Lead	44	83.67	11.86	36.66	122.78	82	7
Mercury	43	2.39	0.741	1.65	6.5	1.65	4
Nickel	45	1,267.34	739.94	5.02	3,822.55	470	0
Silver	38	4.56	4.29	1.18	30	4	4
Zinc	44	123.44	33.68	22.49	277.73	120	5

Table 3-2: Summary of Chronic Toxic Metal Standards and National Toxics Rule

Chronic	Obs.	Mean	Standard Dev.	Min. Value	Max. Value	National Toxics Rule	# of states at NTR
Copper	48	11.72	2.69	6.25	20	9	0
Chromium lll	41	176.97	52.84	86.05	210.47	86	0
Chromium VI	44	11.97	4.65	10	40	11	20
Lead	46	5.75	7.28	3	36.66	3.2	8
Nickel	46	142.54	80.34	5.02	424.95	52	0
Zinc	46	112.24	31.64	22.49	250.05	120	7

*All standards are measured in micrograms per liter

Monitoring and Assessment

Once these state water quality standards are set and approved by the EPA, tbey constitute tbe benchmark by which a state monitors and evaluates the health of its waters.[4] States are required to submit a triennial assessment of the quality of their waters to Congress, and a state witb harsher standards will have a tougher benchmark by wbich the success of its environmental progress is judged.

Furthermore, states use the water quality standards to establish point source discharge limits under the National Pollution Discharge Elimination System (NPDES). This is important because it sets a limit on the amount of pollution that industrial sources in the

[4] See Note 1 for further discussion of EPA approval process.

region are permitted to release into a particular water system. A state with stricter water quality standards will issue fewer pollution rights in the form of discharge permits, and this can have critical economic implications for the industries involved.

Database of Toxic Metals

I compiled a dataset from the recently published EPA website that contains information on state water quality standards effective as of May 30, 2000. In order to construct the database, I had to search through a summary of each state's standards, some of which were quite lengthy, for the relevant data on water quality. This took considerable time, and great care was taken to accurately catalogue the set of standards for each state.

I initially intended to include in the database regulations governing levels of fecal coliform, ammonia, nitrogen, and phosphorus. Although important indicators of water quality, these measures were impossible to compile because they simply were not reported by a majority of states. Another problem associated with collecting these specific indicators stems from the inconsistencies in how the states that reported these standards described them.

Therefore, I decided to use the state standards in place for toxic metals as the dependent variables for analysis. Metals accumulate in the water both naturally and from anthropogenic sources such as mining, agriculture, and industry. Without adequate abatement and treatment, high levels of these toxic metals are ultimately destined for the public water supply. Some metals can also bioaccumulate[5] in the fish and shellfish consumed by humans, causing further detrimental effects. In general, high-level

[5] Bioaccumulation: the process by which a compound is taken up by, and accumulated in the tissues of an aquatic organism from the environment, both from water and through food.

exposure to these metals can pose serious health risks, including an increase in the incidence of cancer in human and animal populations.

The standards for toxic metals are separated into **acute**[6] and **chronic**[7] measures. The acute criteria reflect short-term exposure, while the chronic criteria represent continued exposure to toxic levels over a period of time. The chronic criteria are stricter than their acute counterparts because of increased exposure time, and both levels are included in the current analysis.

Another characteristic of the database is that it is constructed for the category of **freshwater aquatic life**. I decided to use aquatic life as the benchmark variable because there did not seem to be much variation in the standards protecting human health, perhaps due to more stringent regulation on the part of the federal government. Also, I applied freshwater standards instead of those available for saltwater; using saltwater standards would have severely limited the number of observations in an already small sample base of 50 by eliminating inland states. Criteria for groundwater standards were rarely available in the database and for that reason were excluded as well.[8]

Water quality standards for arsenic, cadmium, and selenium were collected but are excluded from the current analysis. This is due to the lack of variation in these standards; most states chose the same guideline (often the federal guideline), or the state standards were clustered at two values. Also, most states did not report the chronic values for silver or mercury, and for this reason they are only represented in their acute form. Thus, the

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[6] Acute: involving a stimulus severe enough to rapidly induce a response; a response measuring death observed within 96 hours or less is typically considered acute.

[7] Chronic: involving a stimulus that lingers or continues for a relatively long period of time; the measurement of a chronic effect can be reduced growth, reduced reproduction, or death.

[8] See Note 2 for technical discussion of database.

metals chosen for analysis in the this study – copper, chromium III and VI, lead, mercury, nickel, silver, and zinc – all have substantial variation in their standards, permitting the use of a common statistical technique.

There are missing data points where states did not report standards. The number of observations for each toxic criterion ranges from 38 to 48, and the average number of observations per toxic metal is 44. For example, Massachusetts is not represented in the sample because its criteria are site-specific and no distinct statewide standard is listed for either the chronic or acute levels. Florida and North Carolina only listed chronic level standards, so these states are not represented in the acute regressions.

The distributions of state standards are highly non-normal, i.e., some states have much stricter or looser standards than others and they represent outliers in the dataset. For example, Hawaii had standards that were much tougher than any other state, while Iowa, Missouri, Nebraska, and Louisiana, were among the weakest regarding water quality regulation. In order to ensure that extreme states such as Hawaii did not bias the outcome, I did specification checks by running the regression with and without the outlier states. The regressions performed better with these observations included, so there was no justification for deleting them. Therefore, all of the states that have published data available are included in the sample.

Empirical Design

The Peltzman model of legislative decision-making is employed in describing the variation among state environmental standards. In the context of this work, a state legislator will balance the loss of industry votes due to stricter standards against the gain in consumer votes from enhanced environmental quality. This being the case, each

state's standard-setting behavior will reflect its own political, economic, and social cost-benefit structure. The set of independent variables that are used to test this theoretical model are described below, and summary statistics are provided in Table 3-3. Since the numeric standards are measured directly, lower values of the dependent variable correspond to stricter water quality standards.

Table 3-3: Summary of Independent Variables

	Mean	Standard Dev.	Min. Value	Max. Value
Sierra Club	0.203	0.120	0.043	0.547
LCV Score	42.39	26.00	5	98
Medinc	28,948	5,558	20,136	41,721
Industry	5.80	2.66	1.13	12.91
Agriculture	41.06	25.07	0.2	92.5
Precipitation	35.62	14.16	9.06	57.77
Temperature	52.39	8.62	40.1	77.2
Coastal	0.56	0.50	0	1

Consumer Influence

I measure consumer influence in the empirical model by including a set of independent variables that capture the demand for environmental quality among the state electorate. The variables that I identify for these purposes are participation in the Sierra Club, the level of environmentalism of elected officials (LCV scores), and median income.

Sierra Club. The percent of the state population belonging to the Sierra Club is used to measure the demand for environmental quality among state consumers. As the largest grassroots conservation organization (over 700,000 members nationwide), the Sierra Club variable should provide an adequate proxy of consumer tastes for the environment. Following the Peltzman model, a state with a larger percentage of consumer participation

in the Sierra Club should have stricter regulatory standards at the state government level. Therefore, the predicted sign for Sierra Club is negative.

LCV Score. The voting behavior of elected officials on environmental issues is a second measure of consumer preferences in this model. The propensity to elect environment-friendly officials is an important indicator of overall demand for these goods. This variable is measured as the average rating on a series of recent League of Conservation Voters congressional scorecards for members of the U.S. House of Representatives (1997-2001), revised to exclude potential partisan bias by the organization [see Chapter 5 for a detailed explanation of the revised index]. The LCV scorecard rates congressional voting behavior on select environmental votes, where a 100% score corresponds to perfect agreement with the LCV agenda.

The expected sign for this variable is negative. The higher the adjusted state LCV scores, the more likely consumers are concerned with environmental issues (as evidenced by their voting behavior), and thus the stricter should be the state standards.

Environmental Kuznets Curve. The inclusion of median income levels as an indicator of increased consumer opposition to relaxed environmental standards is less straightforward. An extensive amount of research has provided evidence that median income and environmental quality are better represented by a quadratic form (inverted-U hypothesis). This theory argues that environmental quality suffers as income rises initially, but beyond a certain threshold income level, economic growth is associated with greater levels of environmental quality.

The empirical literature does not extend this relationship between median income and environmental quality to the actual standards in place to achieve these results, which is a

focus of the current paper. The hypothesized signs for the coefficients on median income and median income-squared are positive and negative, respectively, i.e. toxic metal standards are weakened at low levels of income growth, and strengthened at high levels of income growth.

A final consideration is whether the regression suffers from multicollinearity among the three consumer variables. Although a significant amount of correlation does exist between Sierra Club, liberalism, and median income (between 0.55 and 0.59), specification checks did not provide evidence that this correlation was having a noticeable effect on the outcome. Therefore, for simplicity, only the specifications reporting all three of the consumer variables will be reported.

Polluter Influence

In the Peltzman model, industrial concerns that are affected by an increase in the stringency of environmental regulations will lobby legislators against such policies. The state officials will weigh the gain in industry votes from decreasing environmental regulations against the loss in consumer votes that results from lower levels of environmental quality. For that reason, states with greater interests in heavily polluting industries are more likely to set weaker air quality regulations.

However, some research has linked higher levels of industrialization to more liberal environmental policies [See, for example, Lowry (1992) and Ringquist (1993)]. The hypothesis behind this assumption is that states with large polluting industries find it necessary to develop reactionary environmental policies to control already existing pollution problems within the state. In the context of this model, the value to consumers of reducing pollution levels is higher in relatively dirtier states, which will boost overall

consumer opposition to relaxed environmental standards that favor industry. Subsequently, a vote-maximizing legislator would set more restrictive environmental policies in these states. Two different specifications for industry (specific and general) were developed to test these competing theories.

Specification 1. For each dependent variable, I identified major polluting industries (responsible for over 90% of the toxic releases to land and water from 1987 to 1993) from the list of sources provided by the EPA. I then mapped these polluting industries into categories that could be used as the independent variables with an index of Census data - this mapping is provided in Table 3-4. The polluters of each toxic metal are added together to obtain a single composite measure of the percentage of the labor force in the major polluting industries specific to each toxic criterion.

Also included in this specification are primary mining activities, as this can result in elevated pollution levels as well. To test the possibility that the mining industry is a major player in the development of state standards, a dummy variable specific to each metal is included to identify whether a state is a producer of that metal (from primary mining activities, secondary extraction as a byproduct, or through recycling methods).

The hypothesized sign on these variables is positive if industrial concerns are weighed more heavily than consumer concerns – a higher level of each activity within a state would increase the political cost of abatement, leading to weaker standards. On the other hand, a negative sign on the industry and mining coefficients would imply a more responsive role for the state government with regard to increasing pollution problems.

Table 3-4: Matching of Independent Variables with Major Polluting Industries		
Toxic Metal	Major Polluting Industries*	Independent Variables**
Copper	Primary copper smelting Other nonferrous smelting Plastic materials Steel blast furnaces	Nonferrous foundries " Plastic materials Blast furnaces
Chromium III and VI	Industrial organics Steel blast furnaces Electrometallurgy	Industrial organic chemicals Blast furnaces Electrometallurgy
Lead	Steel blast furnaces Lead smelting, refining Iron foundries Copper smelting China plumbing fixtures	Blast furnaces Electrometallurgy " " Vitreous plumbing fixtures
Mercury	Chemical and allied products Paper mills	Chemical and allied products Paper mills
Nickel	Primary nonferrous metals Steel blast furnaces Ind. organic and inorganic chemicals Petroleum refining	Primary nonferrous metals Blast furnaces Industrial inorganic/organic chemicals Petroleum refining
Silver	Metal plating Photographic processing	Misc. fabricated metal products No IV found
Zinc	Fertilizers Nonferrous smelting Chemical and allied prods	Agricultural chemicals Nonferrous foundries Chemical and allied prods

*Major polluting industries as reported by the Toxics Release Inventory, 1987-1993
**All independent variables are measured as the percentage of the state labor force in the polluting industry

Specification 2. A more general measure of polluting industries is tested in this model as well. This second industry variable is defined as the percent of the 1998 workforce in the top seven polluting industries. Unlike the first specification, this variable does not differ with the dependent variable, but is a composite measure of the overall importance of toxic industries in setting standards. The major polluters are identified in this specification as the motivators for laxer environmental policy.

Agriculture

Agricultural operations are another major polluter of surface waters. Toxic metal pollution from these sources generally results from the run-off of agricultural chemicals

and pesticides, as well as livestock and slaughtering facilities. The variable agriculture is defined as the percentage of state acreage used for agricultural purposes[9] and attempts to capture these effects.

In terms of the Peltzman model, a state with a large agricultural base will see greater benefits from looser standards, as more of their state economy is dependent on the industry. A legislator will maximize votes in these states by adopting weaker standards, and the expected sign on the variable is positive. However, if state officials respond to the intensity of pollution from these sources by setting stricter environmental standards, then the sign on the coefficient would be negative.

Geographic Characteristics

The natural variations in geographic location and climate conditions will affect the cost of compliance with environmental regulations. The following explanatory variables are designed to characterize these differences across states.

Precipitation. The first of these geographic variables is precipitation. In order to capture the effects of rainfall on environmental compliance costs, I constructed a 50-year average of state annual precipitation levels. Precipitation levels are important in understanding the natural chemistry of the water, because rainfall will affect the rate and flow of pollution deposits. Higher precipitation levels can lead to excess pollution overflow from agricultural, urban, and industrial run-off, which increases the cost of compliance with stricter standards. For this reason, I hypothesize that precipitation will have a positive sign; more specifically, as the cost of compliance goes up, industrial opposition to stricter standards increases.

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[9] A farm would be included in this acreage if it produced or sold at least $1,000 in agricultural products.

The second geographic variable I include to identify natural peculiarities among states is temperature, and consists of a 50-year average of the daily mean temperature. The rate of dissolution of toxic pollutants is highly dependent on water temperature: all else equal, the pollutant is taken out of the water column much more quickly in a warm water environment. Since an increase in average temperature leads to a drop in the cost of compliance (and a decrease in industrial opposition), a legislator will be more likely to adopt stricter standards. For this reason, the hypothesized sign on the temperature variable is negative.

Finally, a dummy variable is included that indicates whether or not the state borders an ocean or the Great Lakes. Research shows that pollution is less severe in coastal cities, possibly due to the dispersal from offshore winds, which limits the deposit of airborne pollutants in the waterways, and to the smaller average inflow of pollution from neighboring cities. Since the political cost of abatement is smaller for coastal states, I expect the sign on coastal to be negative.

Statistical Issues and Specification

There was concern that states adopting the national guidelines did so in order to expend the least amount of effort complying with the federal mandate. If this were the case, the inclusion of these states as observations in the study of state standard setting behavior could bias the regression results. However, specification checks omitting these states did not improve on the overall results.

I also investigated whether a two-step regression procedure would be appropriate in these circumstances. The first step consists of explaining the decision of whether or not to adhere to the federal guideline. The second stage addresses the variation in standards

for states that set their own levels (taking into account the likelihood of adopting the guideline). I experienced little success in explaining which states adopted the federal standard, and it thus appears that no systematic bias is associated with the adoption of the federal guideline.

This being the case, two specifications are developed to test the Peltzman model in this policy area. The first specification develops a pollutant specific explanatory variable for industry and mining. These independent variables directly measure the prevalence of the industries responsible for the majority of each specific pollutant.

Specifically, I estimate:

$$y_i = \beta_0 + \beta_1(\text{Sierra Club})_i + \beta_2(\text{LCV score})_i + \beta_3(\text{Medinc})_i + \beta_4(\text{Medinc}^2)_i + \beta_5(\text{Metal-specific industries})_i + \beta_6(\text{Mining})_i + \beta_7(\text{Agriculture})_i + \beta_8(\text{Precipitation})_i + \beta_9(\text{Temperature})_i + \beta_{10}(\text{Coastal}) + \varepsilon_i$$

where ε_i is an iid and normally distributed error term.

The second specification tests a more general measure of industry that does not vary across the toxic metals. This independent variable is instead a composite measure of the major industries responsible for all toxic metal pollution.

Specifically, I estimate:

$$y_i = \beta_0 + \beta_1(\text{Sierra Club})_i + \beta_2(\text{LCV score})_i + \beta_3(\text{Medinc})_i + \beta_4(\text{Medinc}^2)_i + \beta_5(\text{Heavy industry})_i + \beta_6(\text{Agriculture})_i + \beta_7(\text{Precipitation})_i + \beta_8(\text{Temperature})_i + \beta_9(\text{Coastal})_i + \varepsilon_i$$

where ε_i is an iid and normally distributed error term.

Results

The results from the two specifications developed to explain the variation across states in toxic metal water quality standards are provided in Tables 3-5 through 3-9. The specifications are separated according to the acute and chronic values of the dependent

variable. The first two tables report the specification that separates the explanatory variables for heavy industry and mining into pollutant-specific sources. Tables 3-8 and 3-9 provide the results from the general measure of toxic metal polluting industries that does not vary across pollutants.

In order to test the significance of the coefficients across equations (i.e. to assess overall significance), I performed an inverse chi-square test, also known as a Fisher or Pearson P_λ test. [For example, see Dewey, Husted, and Kenny (2000)]. Based on evidence from the regressions, it can be shown that $\Sigma\text{-}2\log_e p_i$, i=1, 2,…,k, has a $\chi_{(k)}^2$ distribution with 16 degrees of freedom for the acute regressions and 12 degrees of freedom for the chronic regressions, where p_i is the probability given for each coefficient. A similar P_λ test was performed across the regressions to test the inverted-U hypothesis of median income. These results are reported in Table 3-7.

I used this test for the acute and chronic levels of the metals, assuming independence across regressions within these separate values. For example, the regression for chronic copper can reasonably be assumed to be independent of chronic zinc, but that it is not necessarily independent of acute copper. For this reason, separate P_λ tests are performed on the chronic and acute values.

Finally the results from one-tailed t tests are reported for Sierra Club, medinc, $medinc^2$, LCV score, precipitation, temperature, and coastal, since the null hypothesis on these variables makes specific sign predictions. The results from two-tailed t tests are provided for the other explanatory variables (including agriculture and the aggregate and general specifications for heavy industry).

For simplicity, the regressions in which there are no significant coefficients are excluded from the results tables. This includes one regression for nickel and chromium III, and two regressions for lead. However, the statistical values from these metals are included in the overall calculation of the P_λ test results.

Metal-Specific Results

Tables 3-5 and 3-6 separate the metal-specific results into the acute and chronic values. Copper and zinc are the best performing dependent variables, with significant coefficients on a number of the independent variables. Moreover, the average F probabilities for these two metals is 0.057 and 0.028, along with an average R^2 that is relatively high compared to the other regressions, at 0.35 and 0.41, respectively. Lead provides similar results for only the acute standards, while the other metals offer less convincing evidence in support of the chosen model. The individual explanatory variables used to explain state water quality standards in this specification provide varying levels of support for the theory.

Agriculture is significantly positive in half of the regressions, and the P_λ tests show the farming coefficients to be significantly positive across the equations. A one standard deviation rise in the variable agriculture causes between a 0.37 and 0.56 standard deviation weakening in the state standards. The positive and significant coefficients on agriculture support the theory that legislators take into account the strength of farming interests when setting environmental policy. In particular, a more dominant agriculture industry will decrease the likelihood that a legislator will set strict state standards for water quality.

Table 3-5: Acute Regression Results (Metal-specific industries)

Variable	Copper	Chromium III	Chromium VI	Lead	Mercury	Silver	Zinc
Sierra Club	-4.98 (-0.67)	-340.94* (-1.37)	1.07 (0.08)	-12.38 (-0.60)	0.335 (0.19)	-1.97 (-0.23)	17.81 (0.31)
LCV score	0.012 (0.38)	1 42 (1.21)	0.025 (0 42)	-0.080 (-0.88)	0.335 (0.19)	0.026 (0.59)	-0.262 (-1.07)
Medinc	0.0018* (1 57)	-0.031 (-0.71)	0.002 (0.73)	0.007** (2.09)	-0.00004 (-0.15)	0.0005 (0.30)	0.015* (1.63)
$Medinc^2$	-0.00000003** (-1.70)	0.0000004 (0.61)	-0.000000024 (-0 68)	-0.0000001** (-2.16)	0.0000000006 (0.15)	-0.000000006 (-0.25)	-0.0000002* (-1.57)
Metal-specific industries	-2.08 (-1.16)	-32.32 (-0.53)	-0.758 (-0.26)	2.96 (0.34)	0.018 (0.06)	6.06 (1.20)	7.08 (0.71)
Mining	0.906 (0.76)	-198 56 (-1.34)	-3.19 (-0 40)	2.09 (0.74)	0.192 (0.56)	0.724 (0.49)	-3.71 (-0 50)
Agriculture	0.059* (1 84)	0.937 (0 88)	0.141** (2.53)	0.030 (0.35)	0.012* (1.91)	0.075* (1.69)	0.720*** (3.03)
Precipitation	0.152*** (2 29)	-5.35 (-2 07)	0.149 (1.22)	0.214 (1 27)	0.006 (0 46)	0.041 (0.44)	1.09** (2.23)
Temperature	-0.105* (-1.38)	3.65 (1.02)	0.006 (0 04)	-0.696*** (-3.06)	-0 001 (-0.07)	-0.080 (-0.79)	-1.31** (-2.09)
Coastal	-1.64 (-1.00)	168.77 (2.56)	-4.30* (-1.31)	6.42 (1.36)	-0.192 (-0.55)	-0.648 (-0.28)	-19.17* (-1.48)
Constant	-8.22 (-0 43)	2158.36 (2.96)	-19.34 (-0.51)	12.05 (0.23)	2.12 (0.51)	-6.48 (-0.25)	-98.12 (-0.65)
Turning Point for Medinc	$29,290	N/A	$34,110	$30,610	N/A	$38,490	$33,315
# of obs	45	40	43	44	43	38	44
Prob F	0.0780	0.2172	0.4791	0.0569	0.8645	0.6707	0.0309
R-squared	0.3599	0.3301	0.2345	0.3855	0.1394	0.2180	0.4173
Root MSE	3.6645	128.34	7.213	10.615	0.78799	4.438	29.343

T statistics in parenthesis: ***significant at the 1% level, ** significant at the 5% level, *significant at the 10% level, for a one-tailed test (except for Heavy industry, Mining, and Farms, where a two-tailed test is used); Nickel regression not reported (no significant variables)

The geographic variables also perform relatively well in explaining the variation in state toxic metal standards. Precipitation is significantly positive in five of the regressions, where a one standard deviation rise in precipitation levels leads to an average 0.41 standard deviation increase in the dependent variable. These results are further supported by the P_λ tests, in which precipitation is significantly positive across the regressions. Temperature is significantly negative in four of the regressions, but the P_λ tests support these results only for the acute standards. Moreover, a one standard deviation rise in temperature levels prompts between a 0.22 and a 0.51 standard deviation strengthening in the state standards.

Table 3-6: Chronic Regression Results (Metal-specific industries)

Variable	Copper	Chromium III	Chromium VI	Nickel	Zinc
Sierra Club	-6.40* (-1.33)	-10.85 (-0.11)	0.462 (0.05)	-129.45 (-0.87)	27.27 (0.51)
LCV score	0.024 (1.17)	0.106 (0.22)	0.013 (0.32)	0.362 (0.57)	-0.273 (-1.19)
Medinc	0.0006 (0.83)	-0.014 (-0.79)	0.001 (0.73)	0.020 (0.84)	0.011* (1.35)
$Medinc^2$	-0.00000001 (-0.89)	0.0000002 (0.66)	-0.00000002 (-0.68)	-0.0000003 (-0.90)	-0.0000002 (-1.25)
Metal-specific industries	-1.41 (-1.24)	-61.37*** (-2.61)	-0.480 (-0.26)	-15.17 (-0.53)	5.64 (0.63)
Mining	0.40 (0.50)	-24.90 (-0.42)	-1.62 (-0.31)	-35.08 (-0.59)	-5.89 (-0.84)
Agriculture	0.041* (1.90)	-0.349 (-0.81)	0.084** (2.29)	1.02 (1.59)	0.701*** (3.14)
Precipitation	0.066* (1.53)	-0.725 (-0.70)	0.088 (1.12)	1.73* (1.43)	0.963** (2.17)
Temperature	-0.061 (-1.27)	0.980 (0.72)	-0.010 (-0.11)	-1.11 (-0.71)	-1.22** (-2.19)
Coastal	-1.40 (-1.27)	26.32 (0.98)	-2.70 (-1.25)	-45.97* (-1.33)	-20.25** (-1.67)
Constant	3.63 (0.30)	412.12 (1.47)	-9.99 (-0.42)	-149.52 (-0.37)	-55.45 (-0.40)
Turning Point for Medinc	$29,710	N/A	$34,300	$30,310	$34,600
# of obs	48	41	44	46	46
Prob F	0.0847	0.3858	0.5827	0.3040	0.0256
R-squared	0.3338	0.2703	0.2056	0.2608	0.4096
Root MSE	2.4702	52.123	4.7337	78.325	27.563

T statistics in parenthesis. ***significant at the 1% level, ** significant at the 5% level, *significant at the 10% level, for a one-tailed test (except for Heavy industry, Mining, and Farms, where a two-tailed test is used); Lead regression not reported (no significant variables)

Table 3-7: Pearson P_λ Test Statistics

	Metal-specific industries		Aggregate industries	
Variable	Acute ($\chi^2_{(16)}$)	Chronic ($\chi^2_{(12)}$)	Acute ($\chi^2_{(16)}$)	Chronic ($\chi^2_{(12)}$)
Sierra Club	19.04	14.02	18.26	14.71
LCV Score	10.95	8.01	12.08	6.98
Medinc	High values 26.13* Low values 27.47**	High values 17.10 Low values 15.56	High values 32.10*** Low values 34.03***	High values 18.56* Low values 20.44*
Metal-specific industries	Neg: 13.23 Pos: 13.89	Neg: 19.90* Pos: 7.03	N/A	N/A
Mining	Neg: 14.11 Pos: 13.17	Neg: 11.45 Pos: 8.68	N/A	N/A
Heavy industry	N/A	N/A	Neg: 22.66 Pos: 6.65	Neg: 19.94* Pos: 4.59
Agriculture	Neg: 1.92 Pos: 50.16***	Neg: 3.62 Pos: 38.82***	Neg: 2.40 Pos: 50.11***	Neg: 3.98 Pos: 38.82***
Precipitation	34.52***	23.27**	47.55***	24.78**
Temperature	34.11***	17.50	35.50***	17.33
Coastal	21.47	20.23*	23.05	20.96*

Low and high levels of median income are the approximate min and max values for the variable medinc ($20,000 and $40,000, respectively).

Finally, the coastal dummy provides significant and correctly signed coefficients in four of the sixteen possible regressions, and is significant across the regressions for both the acute and chronic standards. A one standard deviation rise in coastal leads to an average decrease of 0.45 standard deviations in the dependent variable. These overall results for the geographic variables support the theory that location and climate conditions that inflate the cost of compliance with environmental regulations will increase industrial opposition to stricter standards. This will cause a vote-maximizing legislator to set weaker overall standards.

The inverted-U hypothesis is supported in only the acute regressions, where three of the eight possible equations provide confirmation of the theory. The P_{λ} tests for the acute regressions confirm this relationship with significantly positive coefficients at low income levels and significantly negative coefficients at high income levels. Also, the average peak of median income (beyond which further increases in income will be associated with a strengthening of water quality standards) is $31,000 for those regressions where this relationship holds. This is near the national median household income, which is approximately $29,000. States with a median income level near this threshold level include Georgia, Indiana, Pennsylvania, Wisconsin, and Utah.

These results suggest that increases in median income will affect the state environmental regime differently in relatively poorer or richer states. For states with income levels below the national average, increases in income levels will further weaken water quality standards, while those above the national average will choose to tighten standards as income rises. These results provide an interesting addition to previous

findings in the empirical literature, extending beyond the simple explanation linking GDP and environmental quality to the actual standards in place that regulate these changes.

The mining and LCV variables do not provide significant results, while the variables for Sierra Club membership and metal-specific industries are significant in only one of the regressions. With the exception of the significantly negative coefficients across the chronic regressions for industry, the P_λ tests provide no further support for the theory.

Aggregate Results

The results are similar for the aggregate specifications for industry, with coefficient signs and significance levels that are generally consistent with the earlier results. Copper and zinc are still the best performing dependent variables, with average F probabilities of 0.043 and 0.024, along with relatively high R^2 values of 0.364 and 0.402. Nickel performs well for the chronic standard, while lead offers similar evidence for the acute standards.

Agriculture is significantly positive in over half of the regressions, and is supported by both P_λ tests at the 1% significance level. In these regressions, a one standard deviation rise in agriculture prompts between a 0.32 and 0.52 standard deviation weakening of the state standards.

Precipitation is significantly positive in nine of the regressions as well, and is supported across the equations by the P_λ tests. A one standard deviation rise in precipitation levels leads to an average 0.39 standard deviation weakening of the dependent variable. Temperature is significantly negative in five of the regressions, but the P_λ tests support these results for only the acute standards. A one standard deviation

rise in temperature levels prompts between a 0.22 and 0.54 standard deviation strengthening in the state standards.

Table 3-8: Acute Regression Results (Aggregate industries)

Variable	Copper	Chromium VI	Lead	Mercury	Nickel	Silver	Zinc
Sierra Club	-4.66 (-0.66)	0.133 (0.01)	-14.25 (-0.70)	-0.297 (-0.18)	-1175.44 (-0.83)	-1.19 (-0.13)	5.12 (0.09)
LCV score	-0.0009 (-0.03)	0.025 (0.43)	-0.097 (-1.11)	0.005 (0.79)	3.72 (0.62)	0.014 (0.35)	-0.230 (-0.95)
Medinc	0.002** (2.03)	0.002 (0.86)	0.008** (2.19)	0.0001 (0.49)	0.274 (1.13)	0.001 (0.72)	0.017** (1.75)
$Medinc^2$	-0.00000004** (-2.18)	-0.00000003 (-0.82)	-0.0000001** (-2.25)	-0.000000002 (-0.52)	-0.000005 (-1.22)	-0.00000002 (-0.67)	-0.0000003** (-1.71)
Heavy industry	-0.400 (-1.55)	-0.397 (-0.77)	-0.247 (-0.26)	-0.066 (-1.16)	-62.21 (-1.18)	0.091 (0.19)	-0.635 (-0.29)
Agriculture	0.052* (1.91)	0.139** (2.55)	0.010 (0.13)	0.011* (1.88)	7.65 (1.34)	0.071* (1.83)	0.696*** (2.94)
Precipitation	0.154*** (2.53)	0.184* (1.48)	0.253* (1.32)	0.011 (0.82)	20.87** (1.67)	0.080 (0.90)	1.20*** (2.39)
Temperature	-0.114* (-1.54)	-0.14 (-0.10)	-0.740*** (-3.40)	-0.002 (-0.09)	-12.86 (-0.87)	-0.048 (-0.48)	-1.16** (-1.93)
Coastal	-1.87 (-1.22)	-4.32* (-1.34)	5.89 (1.26)	-0.159 (-0.46)	-323.78 (-1.02)	-1.75 (-0.80)	-17.43* (-1.34)
Constant	-13.82 (-0.72)	-23.13 (-0.60)	6.81 (0.12)	0.107 (0.03)	-2339.77 (-0.60)	-17.02 (-0.65)	-128.38 (-0.82)
Turning Point for Medinc	$29,310	$33,220	$30,590	$29,340	$29,120	$33,880	$32,220
# of obs	44	42	43	42	44	37	43
Prob F	0.0303	0.3693	0.0416	0.6893	0.3441	0.7574	0.0246
R-squared	0.3904	0.2416	0.3825	0.1679	0.2366	0.1747	0.4090
Root MSE	3.576	7.1728	10.639	0.77463	735.18	4.5581	29.516

T statistics in parenthesis: ***significant at the 1% level, ** significant at the 5% level, *significant at the 10% level, for a one-tailed test (except for Heavy industry and Farms, where a two-tailed test is used); Chromium III not reported (no significant variables)

Finally, the coastal dummy provides significant and correctly signed coefficients in five of the sixteen possible regressions, but is significant across the regressions for only the chronic standards. A one standard deviation rise in coastal causes between a 0.52 and 0.60 standard deviation decline in the dependent variable.

Heavy industry is significant in only one of the regressions (the chronic value of chromium III). However, the P_λ tests show that this variable is significantly negative across the chronic regressions at the 10% level, supporting the hypothesis that states take a responsive role to pollution problems by setting stricter standards. Sierra Club membership is significant and correctly signed only for chronic copper, while LCV score is not significant in any of the equations.

Table 3-9: Chronic Regression Results (Aggregate industries)

Variable	Copper	Chromium III	Chromium VI	Nickel	Zinc
Sierra Club	-6.10*	1.49	-0.174	-134.24	24.13
	(-1.30)	(0.01)	(-0.02)	(-0.90)	(0.45)
LCV score	0.019	0.114	0.013	0.376	-0.239
	(0.94)	(0.22)	(0.34)	(0.59)	(-1.05)
Medinc	0.0008	-0.014	0.001	0.031	0.011
	(1.07)	(-0.74)	(0.81)	(1.26)	(1.25)
$Medinc^2$	-0.00000001	0.0000002	-0.00000002	-0.0000005*	-0.0000002
	(-1.12)	(0.62)	(-0.76)	(-1.31)	(-1.16)
Heavy industry	-0.225	-6.88*	-0.234	-3.92	0.965
	(-1.37)	(-1.84)	(-0.74)	(-0.73)	(0.50)
Agriculture	0.039**	-0.407	0.083**	1.10**	0.684***
	(2.13)	(-0.91)	(2.33)	(1.76)	(3.06)
Precipitation	0.066**	-0.628	0.106*	2.11**	0.887**
	(1.67)	(-0.58)	(1.34)	(1.67)	(1.96)
Temperature	-0.069*	0.708	-0.026	-1.21	-1.01**
	(-1.43)	(0.51)	(-0.28)	(-0.79)	(-1.84)
Coastal	-1.52*	20.37	-2.68	-47.44*	-19.10*
	(-1.44)	(0.74)	(-1.27)	(-1.40)	(-1.57)
Constant	2.14	443.73	-10.98	-305.38	-60.24
	(0.18)	(1.48)	(-0.46)	(-0.77)	(-0.43)
Turning Point for Medinc	$29,940	N/A	$33,720	$30,410	$34,000
# of obs	47	40	43	45	45
Prob F	0.0551	0.6529	0.4670	0.2090	0.0230
R-squared	0.3378	0.1857	0.2125	0.2703	0.3956
Root MSE	2.4625	54.798	4 7067	77.776	27.85

T statistics in parenthesis: ***significant at the 1% level, ** significant at the 5% level, *significant at the 10% level, for a one-tailed test (except for Heavy industry and Farms, where a two-tailed test is used), Lead regression not reported (no significant variables)

The unusual divergence in the results for agriculture and heavy industries in both specifications (only agriculture provides consistently significant coefficients) can be interpreted in a number of ways. First of all, industrial concerns may be more likely to lobby for looser standards on either the federal or local levels, and hence do not target state level standards as a major lobbying effort. For example, on the local level, a polluting firm can lobby for increased discharge rights through the number of permits it receives. It can also target the specific water body of concern by lobbying for the establishment of a designated use that allows for greater dumping levels, i.e., have the river declared for industrial uses, instead of the stricter requirements set forth in uses designed for human recreation or fishing.

Moreover, industry may be more easily organized at the federal level than agriculture, where it is difficult to lobby across states lines because of increased organizational costs. Therefore, for agricultural interests, state level lobbying efforts offer a more reasonable alternative to influencing policy objectives. These organizational costs of lobbying may be smaller for heavy industry, and there would be a general incentive to lobby at the federal level for companies with facilities spanning more than one state.

Finally, the inverted-U hypothesis is more strongly supported in the acute regressions, where three of the eight possible equations provide confirmation of the quadratic relationship. However, the P_λ tests for the both the acute and chronic values support this hypothesis with significantly negative coefficients at high income levels and significantly positive coefficients at low income levels. Also, the average peak of median income (beyond which further increases in income will be associated with a strengthening of water quality standards) is $30,700 for those regressions where this relationship holds, only $300 below the average peak of the earlier specification.

Conclusions

Using Peltzman's model as the theoretical framework, this paper explains the variation in water quality standards across states. The results from the two specifications that are developed for these purposes show that states take into account not only the agriculture industry, but also income levels and geographical considerations, when setting water quality standards. Toxic metal standards for water quality are weakest in predominantly agricultural states, while heavy industry does not appear to have an equivalent effect on standards.

There is also limited confirmation of an inverted-U shaped curve with respect to environmental standards and income levels. These results verify that increases in median income will have different effects on environmental standards in relatively poorer or richer states. In a state with median income levels below the national average, increases in income will lead to weaker water quality standards. States with above average levels of median income will select stricter standards as income grows. The findings in the previous literature establishing a link between environmental quality and income levels could have reflected lax enforcement of existing regulations. However, this work implies that low-income states actually choose weaker standards, instead of simply turning a blind eye to feeble enforcement efforts.

Notes

1. States are required by the CWA to review their standards every three years and have them re-approved by the EPA before implementation – a process that eliminates the possibility that a state could enact unacceptably low standards. Consequently, there is a fuzzy lower limit under which the EPA will reject weak standards, as they do on a regular basis. However, the rejection of state proposals is not an exact science, as the EPA uses a different measuring stick for each state that takes into account regional-specific considerations, along with scientific evidence available at the time of approval. Unfortunately, the EPA does not maintain data on which state plans are initially rejected, or a past record of state water quality standards. At present, the only data available for analysis are the current standards in place for each state.

2. Most of the toxic criteria are calculated with respect to a hardness factor (expressed in milligrams per liter as calcium carbonate, CaCO(3)). The hardness factors were given at varying levels (50, 100, 200), and I used 100 ml/l for each state in order to make comparison feasible. Also, the metal criteria were listed in either their dissolved or total recoverable form, followed by a conversion factor specific to each metal that should be used to calculate one given the other. I standardized the state criteria by documenting only the total recoverable form, and converting from the dissolved form if that were the only one listed by the state. To illustrate this, assume that a state lists the acute standard for copper using a hardness factor of 50 in the calculation. In order to facilitate comparison across states, I would have to recalculate the standard using the given equation[10] with a

[10] An equation for calculating the acute copper standard is: [e^(1.8190(ln(hardness))+3.688)].

hardness factor of 100. Also, if the standard were listed in its dissolved form, I would multiply this value by a conversion factor[11] in order to transform it to the total recoverable form.

[11] The conversion factor for the acute copper standard is .960.

CHAPTER 4
THE POLITICS OF STATE AIR QUALITY STANDARDS

Introduction

The Clean Air Act of 1970 outlined regulations for six air pollutants, also known as the National Ambient Air Quality Standards (NAAQS). Although states are allowed flexibility in designing an individualized program to meet these federal requirements, they are restricted from setting standards weaker than NAAQS. The Clean Air Act does, however, provide states the ability to set standards stronger than these national levels. In particular, sulfur dioxide regulations vary significantly across states – over 20% currently impose greater restrictions for this aspect of air quality. The variability in SO_2 standards facilitates an empirical investigation into the characteristics of strong air pollution control programs, and will provide the focus of the current analysis.

The theoretical foundation of this work is Peltzman's (1976) legislator vote-maximization model. In the context of this paper, state officials behave rationally by setting environmental policy to maximize political support (and increase the probability of re-election). More specifically, legislators face a trade-off between the desires of consumers for better environmental quality, and that of polluters who favor less stringent regulations.

This chapter tests the Peltzman model by developing a number of specifications to characterize the variation in sulfur dioxide standards across states, controlling for both the strength of industry and consumer groups, as well as geographical differences that affect the cost of compliance. The results from this investigation strongly suggest that

the decision to adopt SO_2 standards stricter than NAAQS is responsive to these forces, supporting the theory that legislators trade-off consumer and producer interests when setting environmental policy.

The existence of an inverted-U shaped curve linking state environmental standards and income is also investigated. This application of the inverted-U hypothesis asserts that the evolution of environmental regulations is essentially different at low and high levels of income. More specifically, income growth at lower levels will precipitate a weakening of environmental standards. However, beyond a certain point further increases in income will be associated with a strengthening of these same standards.

National Ambient Air Quality Standards

The Clean Air Act of 1970 required the newly formed Environmental Protection Agency to establish national standards for a set of principal air pollutants. These new regulations, known as the National Ambient Air Quality Standards (NAAQS), specifically target the reduction of six air pollutants, namely sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), ozone (0_3), and lead (Pb).

Two different types of standards were defined for NAAQS purposes, and these regulations are outlined in Table 4-1. A stricter **primary standard** was developed for the protection of human populations, including that of sensitive sub-populations such as children, the elderly, and asthmatics. Another **secondary standard** targeted the protection of public welfare, such as decreased visibility, damage to animals, crops, and property. However, not all pollutants are regulated by both primary and secondary standards. Their application to a specific pollutant depends on both its chemical

composition and potential negative effects. For example, the primary and secondary standards are equivalent for nitrogen dioxide, particulate matter, ozone, and lead, while carbon monoxide is regulated by a primary standard alone. Furthermore, sulfur dioxide is the only criteria pollutant that has distinct primary and secondary standards.

Table 4-1: National Ambient Air Quality Standards		
Pollutant	Standard Value[1]	Standard Type
Sulfur Dioxide (SO_2)		
Annual Arithmetic Mean	0.030 ppm	Primary
24-hour Average	0.14 ppm	Primary
3-hour Average	0.50 ppm	Secondary
Nitrogen Dioxide (NO_2)		
Annual Arithmetic Mean	100 $\mu g/m^3$	Primary & Secondary
Particulate Matter		
(PM 10)[2]		
Annual Arithmetic Mean	50 $\mu g/m^3$	Primary & Secondary
24-hour Average	150 $\mu g/m^3$	Primary & Secondary
(PM 2.5)[3]		
Annual Arithmetic Mean	15 $\mu g/m^3$	Primary & Secondary
24-hour Average	65 $\mu g/m^3$	Primary & Secondary
Carbon Monoxide (CO)		
8-hour Average	9 ppm (10 mg/m^3)	Primary
1-hour Average	35 ppm (40 mg/m_3)	Primary
Ozone (O_3)		
1-hour Average	0.12 ppm	Primary & Secondary
8-hour Average	0.08 ppm	Primary & Secondary
Lead (Pb)		
Quarterly Average	1.5 $\mu g/m^3$	Primary & Secondary

[1] Parenthetical value is an approximately equivalent concentration
[2] Particles with diameters of 10 micrometers or less
[3] Particles with diameters of 2.5 micrometers or less
Definitions:
ppm = parts per million by volume
mg/m^3 = milligrams per cubic meter of air
$\mu g/m^3$ = micrograms per cubic meter of air

NAAQS is also distinguished by the time periods over which the ambient air conditions are monitored, such as yearly, daily, and hourly averages. To illustrate, the three-hour average for SO_2 (0.50 parts per million) is allowed to peak at 17 times the annual mean (0.03 parts per million). This variability in the standards across time periods is intended to account for temporary spikes in emissions that may occur during the year.

Although states are prohibited from pursuing policies that preclude compliance with existing federal standards, they are allowed the flexibility to develop regulations stricter than NAAQS. Tables 4-2 through 4-6 lists the states that currently have regulations stricter than those mandated by the federal government under the NAAQS program. With the exception of PM 2.5 and lead, all of the criteria pollutants are subject to some variation across the states. Between one and four states impose stricter standards for NO_2, PM_{10}, CO, and 0_3.

Table 4-2: Sulfur Dioxide (SO^2) Standards

State	Annual Arithmetic Mean (Primary)	24-hour Average (Primary)	3-hour Average (Secondary)
NAAQS	0.03ppm	0.14ppm	0.5ppm
California	Same	0.04ppm	Same
Colorado	Same	Same	0.27ppm
Florida	0.02ppm	0.1ppm	Same
Maine	0.022ppm	0.088ppm	0.440ppm
Minnesota*	Same	Same	0.35ppm
Montana	0.02ppm	0.10ppm	Same
New Mexico**	0.02ppm	0.10ppm	Same
North Dakota	0.023ppm	0.099ppm	0.273ppm
Oregon	0.02ppm	0.10ppm	0.050ppm
Washington	0.02ppm	0.1ppm	0.4ppm
Wyoming	0.02ppm	0.10ppm	Same

*Applies to Air Quality Control Regions 127, 129, 130, and 132; NAAQS apply to all other regions
**Standards apply except within 3.5 miles of the Chino Mines Company smelter furnace stack at Hurley, where NAAQS apply

Table 4-3: Nitrogen Dioxide (NO^2) Standards	
State	Annual Arithmetic Mean (Primary and Secondary)
NAAQS	$100\mu g/m^3$
Hawaii	$70\mu g/m^3$

Table 4-4: Particulate (PM 10)		
State	Annual Arithmetic Mean (Primary and Secondary)	24-Hour Average (Primary and Secondary)
NAAQS	$50\mu g/m^3$	$150\mu g/m^3$
California	$30\mu g/m^3$	$50\mu g/m^3$
Maine	$40\mu g/m^3$	Same

Table 4-5: Carbon Monoxide (CO) Standards		
State	8-hour Average (Primary)	1-hour Average (Primary)
NAAQS	9ppm ($10mg/m^3$)	35ppm ($40mg/m^3$)
California	Same	20ppm
Hawaii	$5mg/m^3$	$10mg/m^3$
Minnesota	Same	30ppm
Montana	Same	23ppm

Table 4-6: Ozone Standards (O_3)		
State	8-hour Average (Primary and Secondary)	1-hour Average (Primary and Secondary)
NAAQS	0.08ppm	0.12ppm
California	Same	0.09ppm
Montana	Same	0.10ppm
Nevada	Same	0.10ppm*

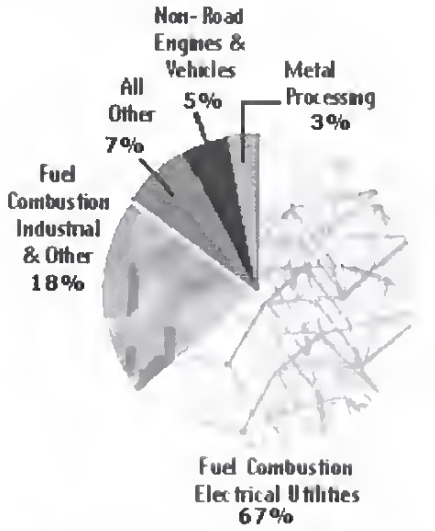
*Applies to Lake Tahoe Basin (#90), NAAQS apply to all other regions

Sulfur dioxide standards offer by far the greatest amount of variation, as eleven states currently implement standards stricter than the federal regulations. The increased variability in SO_2 standards facilitates an empirical examination of the factors that determine whether a state adopts stricter air quality standards, and for that reason will be the focus of the current analysis.

Sulfur dioxide. Sulfur dioxide is an atmospheric pollutant that results from the burning of fuels that contain sulfur, a common ingredient in raw materials such as crude oil, coal, and metallic ores. The major sources of SO_2 emissions are pictured in

Figure 4-1. According to the EPA, 67% of SO_2 emissions come from electric utilities that burn coal and petroleum (a total of 13 million tons per year). Other fuel combustion sources include industries such as petroleum refineries, cement manufacturing, and metal processing facilities. These industries burn either coal or oil to process heat, or derive their products from raw materials containing sulfur. Non-road engines and vehicles, including locomotives, large ships, and diesel equipment, contribute 5% of the total sulfur dioxide emissions.

Figure 4-1



Available from the US EPA Office of Air Quality Planning & Standards, November 2000

The effects of SO_2 pollution are considered to be a serious threat to public health, with the most vulnerable segments of the population being the elderly, children, and asthmatics. Among other exposure related effects, it can contribute to respiratory illness, aggravate existing heart and lung diseases, and lead to skin irritation and inflammation. The environmental consequences of SO_2 pollution are also numerous, the most notorious of which being acid rain. Acid rain is responsible for damaging forests and crops, decreasing soil fertility, and acidifying lakes and streams to the extent that they are no

longer suitable for aquatic life. Acid rain has also been blamed for damaging buildings and outdoor structures, and has decreased visibility in many areas.

Empirical Design

The Peltzman model of legislative decision-making is employed in describing the variation among state ambient air quality standards for sulfur dioxide. In the context of this work, a state legislator will balance the loss of industry votes due to stricter standards against the gain in consumer votes from enhanced environmental quality. This being the case, each state's environmental standard-setting behavior will reflect its own political, economic, and social cost-benefit structure.

Sulfur dioxide ambient air quality standards will be used as the dependent variable in the analysis, and will take on a value of one if the state sets any standard stricter than NAAQS, and zero otherwise. This specification will be discussed in detail, along with a second specification that uses the actual SO_2 standards as the dependent variable. The set of independent variables chosen to characterize this variation are described below, and summary statistics are available in Table 4-7.

Consumer Influence

I measure consumer influence in the empirical model by including a set of independent variables that capture the demand for environmental quality among the state electorate. The variables that I identify for these purposes are participation in the Sierra Club, the level of environmentalism of elected officials (LCV scores), and median income.

Sierra Club. The percent of the state population belonging to the Sierra Club is used to measure the demand for environmental quality among state consumers. As the largest

grassroots conservation organization (over 700,000 members nationwide), the Sierra Club variable should provide an adequate proxy of consumer tastes for the environment. Following the Peltzman model, a state with a larger percentage of consumers participating in the Sierra Club should select stricter regulatory standards. Therefore, the predicted sign for Sierra Club is positive.

Table 4-7: Summary of Variables

	Mean	Stand. Dev.	Min. Value	Max. Value
SO_2 Standard	0.229	0.425	0	1
Annual SO_2 Standard	0.16	0.370	0	1
24-hour SO_2 Standard	0.18	0.388	0	1
3-hour SO_2 Standard	0.12	0.329	0	1
Sierra Club	0.202	0.121	0.043	0.547
LCV Score	42.88	25.68	5	98
Median income	40,940	6,204	29,696	55,146
Coal-burning utilities	0.004	0.007	0	0.040
Coal-burning industries	0.825	0.497	0.236	2.74
Distance to coal quality	1046.4	669.73	0	2115.2
Temperature	51.99	7.65	40.1	70.6
Coastal	0.563	0.501	0	1
PSD parkland	0.644	1.42	0	6.48

LCV Score. The voting behavior of elected officials on environmental issues is a second measure of consumer preferences in this model. The propensity to elect environment-friendly officials is an important indicator of overall demand for these goods. This variable is measured as the average rating on a series of recent League of Conservation Voters scorecards for members of the U.S. House of Representatives (1997-2001), revised to exclude potential partisan bias by the organization [see Chapter 5 for a detailed explanation of the revised index]. The LCV scorecard rates congressional voting behavior on select environmental votes, where a 100% score corresponds to perfect agreement with the LCV agenda.

The expected sign for this variable is positive. The higher the adjusted state LCV scores, the more likely consumers are concerned with environmental issues (as evidenced by their voting behavior), and thus the stricter should be the state standards.

Environmental Kuznets Curve. The inclusion of median income levels as an indicator of increased consumer opposition to relaxed environmental standards is less straightforward. An extensive amount of research has provided evidence that median income and environmental quality are better represented by a quadratic form (inverted-U hypothesis). This theory argues that environmental quality suffers at low levels of income growth, but beyond a certain threshold income level, economic growth is associated with greater levels of environmental quality.

The empirical literature does not extend this relationship between median income and environmental quality to the actual standards in place to achieve these results, which is a focus of the current paper. The hypothesized signs for the coefficients on median income and median income-squared are negative and positive, respectively, i.e. SO_2 standards are weakened at low levels of income growth, and strengthened at high levels of income growth. In order to test for a simpler monotonic effect of income on environmental standards, the results from an alternative specification excluding median income-squared from the equation will also be reported.

A final consideration is whether the regression suffers from multicollinearity among the three consumer variables. Although a significant amount of correlation does exist between Sierra Club, liberalism, and median income (between 0.55 and 0.59), specification checks did not provide evidence that this correlation was having a large

effect on the outcome. However, two additional sets of results are provided tbat individually exclude Sierra Club and liberalism to address these concerns.

Polluter Influence

In the Peltzman model, industrial concerns that are affected by an increase in the stringency of environmental regulations will lobby legislators against sucb policies. The state officials will weigh the gain in industry votes from decreasing environmental regulations against the loss in consumer votes that results from lower levels of environmental quality. For that reason, states with greater interests in heavily polluting industries are more likely to set weaker air quality regulations.

However, some research has linked bigher levels of industrialization to more liberal environmental policies. [See, for example, Lowry (1992), Ringquist (1993)]. The hypothesis behind this assumption is that states with large polluting industries find it necessary to develop reactionary environmental policies to control already existing pollution problems within the state. In the context of this model, the value to consumers of reducing pollution levels is higher in relatively dirtier states, which will boost overall consumer opposition to relaxed environmental standards that favor industry. Subsequently, a vote-maximizing legislator would set more restrictive environmental policies in these states. The contrasting theories regarding the regulatory response to industrial strength will be tested by three explanatory variables that measure the importance of SO_2 polluting industries.

Coal-burning electric utilities. The EPA identifies coal-burning electric utility plants as the source of 67% of sulfur dioxide emissions within the United States (see Figure 4-1). Since these generating plants contribute so heavily to SO_2 pollution

nationwide, the first independent variable seeks to capture their prevalence across states. The variable coal-burning utilities measures the strength of this industry within a state, and is defined as the per capita energy produced from coal (in million kilowatt-hours).

The coefficient will take on a negative sign if industrial interests are weighed more heavily than consumer concerns. However, a positive sign on this coefficient is more likely for two reasons. First, since coal-burning energy producers are responsible for the majority of sulfur dioxide emissions, consumer opposition and responsive state policies are likely to be more prevalent in this industry than in others.

Moreover, public utilities represent government sanctioned natural monopolies. Due to this lack of competition in the market for energy, these producers have less to fear from strict environmental policies. They are not threatened by either the possibility of going out of business or the loss of potential customers, and simply pass on the higher compliance costs to its consumers.

Heavy industry. Although greater than half of sulfur dioxide emissions come from coal-burning utilities, it is important to control for other contributors to SO_2 pollution as well (see Figure 4-1). According to the EPA, these industries include the manufacture of petroleum and coal products (NAICS 3273), cement and concrete products (NAICS 331), and primary metals (NAICS 324). The second independent variable that is constructed to measure the effects of industrial pollution is the percent of the state labor force working in these three industries.

The hypothesized sign on coal-burning industries is positive if consumer concerns are weighed more heavily than industrial interests. However, a negative sign on this coefficient is more likely since stricter environmental standards will result in lower

profits and possible plant closures for local private industries. Also, these private firms provide a credible threat of relocation, increasing the likelihood that a legislator will pursue policies that favor industry.

Distance to quality coal. It is also important to take into account differences in the production processes across firms that affect the severity of SO_2 emissions. The largest factor responsible for differences in sulfur emissions is the quality of coal used (high or low sulfur coal). Firms that utilize coal sources low in sulfur will release significantly fewer emissions than firms that burn high sulfur coal. In order to adequately control for this effect, the average quality of coal available to firms within a state must be taken into account.

Distance to the closest state mining low sulfur coal (measured in miles between state capitals) is used to proxy for the availability of clean coal inputs to state industries. A low sulfur coal source is one that produces coal with a sulfur percent by weight no greater than 0.75% (Wyoming, Montana, Utah, Colorado, Arizona, North Dakota, and New Mexico are included in this variable as low sulfur coal sources). The cost of complying with air quality standards is lower for states with better access to low sulfur coal sources. As a result, opposition from industry to strict standards should be lower than in states that are farther from away these sources. The hypothesized sign for this variable is negative, i.e. as the distance to a low sulfur coal source increases, the cost of complying with strict regulations goes up and decreases the likelihood a state will adopt a stricter SO_2 standard.

Geographic Characteristics

The natural variations across states in geographic location and climate conditions will affect the cost of compliance with environmental regulations. For this reason, it is

necessary to control for these inherent differences in order to avoid an omitted variable bias in the regression outcomes.

Temperature. The first geographic variable identifies natural peculiarities among states in temperature. Sulfur dioxide emissions react with other atmospheric chemicals to form sulfuric acid, a key component of acid rain. The speed and intensity of these chemical reactions is dependent in part upon the availability of heat and sunlight, and temperature is included to proxy for these effects.

Higher temperature levels are associated with an increase in the cost of compliance for polluting industries. A vote-maximizing legislator will account for these greater abatement costs to industry by setting less stringent regulations, and the hypothesized sign on this coefficient is negative.

Coastal location. A dummy variable is included to determine whether the state borders an ocean or the Great Lakes. Research shows that pollution is less severe in coastal cities, possibly due to the dispersal from offshore winds and to the smaller average inflow of pollution from neighboring cities. Since the cost of compliance for polluters is smaller in coastal states, industrial opposition should be less severe. For this reason, I expect the sign on coastal to be positive, i.e. coastal states are more likely to implement stricter SO_2 standards because the cost of doing so is less compared to non-coastal states.

PSD parklands. Another geographic issue deals with the location of Class I Prevention of Significant Deterioration Areas.[12] Since states with Class I regions are already subject to harsher federal regulations regarding the degradation of air quality, it is

[12] See Note 1 for detailed explanation of PSD policies.

possible that the overall state regulations are a function of the existing PSD program within the state, i.e. stricter standards already apply within the majority of the state.

In order to control for this possibility, I constructed an estimate of PSD regions as the percent of state acreage belonging to the mandatory Class I areas including national parks, national wilderness areas, national memorial parks, and international parks. States have the authority to classify other lands as Class I as well, so this measure underestimates the total Class I regions within a state.

However, since other Class I regions are not required by federal mandate, the effect is better captured by these exogenous Class I areas. A state with a larger percentage of land in national parklands will be more likely to impose stricter state air quality standards because more stringent regulations already apply widely within the state. Therefore, the predicted sign for PSD parkland is positive.

Excluded geographic measures. Two excluded variables measuring climate differences across states are precipitation and wind. The first of these, precipitation, is the medium through which sulfur dioxide returns to the land in the form of acid rain – higher precipitation levels will therefore lead to a greater incidence of acid rain within a state. A correlation matrix showed that precipitation was highly correlated with the coal quality measure (0.80), and specification checks provided evidence that this collinearity was affecting the results (precipitation was significant only when coal quality was excluded from the regression). Precipitation was also correlated with the coastal dummy (0.50), which exacerbated the existing multicollinearity problem. For these reasons, this variable was dropped from the regression.

Another geographic variable was constructed that measured wind, an important factor in the dispersal and deposit of air pollutants sucb as sulfur dioxide. However, this variable was difficult to define since direction and speed varied within the state, and data are only available for a limited number of these sites. I constructed a measure of the average annual wind speed, but this variable did not improve the explanatory power of the model. The likely reason for the failed results is that the variable constructed did not adequately measure the effects of wind on SO_2 deposit and dispersal.

Statistical Issues and Specification

The dichotomous dependent variable that has been developed to test the current model would generally lead to the application of a probit (or logit) empirical design. However, since some of the independent variables in this model so closely predict the outcome, use of these techniques becomes problematic. The probit bas difficulty determining the impact of an explanatory variable in tbe model when it almost perfectly explains which states adopt the stricter standards. [For greater discussion, see Kenny and Lotfinia (2002)]. For that reason, a linear probability model will be employed to test the theoretical model in this paper.

Table 4-8 provides the results from four specifications that are developed to test an aggregate measure of state sulfur dioxide standards. In these specifications, a state is considered to have an SO_2 standard stricter than NAAQS as long as one of the three standards for sulfur dioxide (annual arithmetic mean, 24-hour average, or 3-hour average) exceeds the federal guidelines. The first specification includes all of the explanatory variables introduced in the preceding sections (except for precipitation and wind) as possible determinants in the adoption of strict SO_2 standards. Alternative specifications

exclude the variables for LCV score, Sierra Club membership, and median income-squared, respectively. The analysis of these additional specifications is intended to test the robustness of the model and the extent to which multicollinearity is affecting the outcome.

Specifically, I estimate the following linear probability model:

$$y_i = \beta_0 + \beta_1(\text{Sierra Club})_i + \beta_2(\text{LCV score})_i + \beta_3 \text{Medinc}_i + \beta_4(\text{Medinc})^2_i + \beta_5(\text{Coal-burning utilities})_i + \beta_6(\text{Coal-burning industries})_i + \beta_7(\text{Distance to coal quality})_i + \beta_8(\text{Temperature})_i + \beta_9(\text{Coastal})_i + \beta_{10}(\text{PSD parklands}) + \varepsilon_i$$

where ε is an iid and normally distributed error term and the dependent variable has the following form:

$y_i = 0$ if state adopts NAAQS for SO_2
$y_i = 1$ if state imposes any standard stricter than NAAQS for SO_2

The results from an alternative specification of the dependent variable are reported in Table 4-9, which separates it according to each time-dependent standard (annual mean, 24-hour average, and 3-hour average). In these specifications, the dependent variable takes on the actual value of the state SO_2 standard, in contrast to the dichotomous dependent variable of the previous regressions. Since smaller numeric standards translate into stricter regulations, the hypothesized signs on each of the independent variables will be reversed, i.e. smaller values of the dependent variable correspond to tougher standards. For simplicity, only the results for the initial specification that includes all explanatory variables (specification 1 of Table 4-8) will be reported for the disaggregated dependent variable.

The results from one-tailed t tests are reported for Sierra Club, medinc, medinc^2, LCV score, coastal, PSDparkland, temperature, and distance to quality coal, since the null hypothesis on these variables makes specific sign predictions. The results from two-

tailed t tests are provided for the other explanatory variables (including coal-burning utilities and coal-burning industries). Also, the study is limited to the contiguous United States because of the difficulty of measuring proximity to low sulfur coal for Alaska and Hawaii.

Results

Aggregate SO_2 Specifications

Table 4-8 reports the empirical results for the four specifications aggregating the dependent variable. In these regressions, the dependent variable takes on a value of one if the state sets an SO_2 standard stricter than NAAQS, and zero otherwise. All of the four specifications perform well in explaining the variation in state sulfur dioxide standards – the average R^2 is 0.68 and the average adjusted R^2 is 0.60. Moreover, the overall fit of each of the equations is highly significant, as evidenced by their F-probabilities of 0.000. The first specification that includes all of the independent variables has the highest R^2 value (0.70), while the second specification excluding environmental liberalism produces the highest adjusted R^2 (0.63).

Consumer influence. The set of variables that measure consumer influence on legislative decision-making provide results of varying success. Sierra Club is the best performer of these variables and is significant and correctly signed in each of the specifications. A one standard deviation rise in the percent of the state population belonging to the Sierra Club results in an average 0.23 increase in the likelihood that the state will adopt a stricter SO_2 standard.

This provides strong evidence to support the hypothesis that as the percentage of citizens belonging to the Sierra Club rises (reflecting a greater demand for environmental quality), the more heavily consumer interests are weighed relative to polluter interests.

Table 4-8: Regression Results Aggregating the SO_2 Standard

Variable	Specification 1	Specification 2	Specification 3	Specification 4
Sierra Club	1.85*** (3.44)	1.91*** (3.96)	N/A	1.82*** (3.36)
LCV score	0.0008 (0.27))	N/A	0.0049** (1.67)	0.0012 (0.41)
Median income	-0.00014** (-1.76)	-0.00014** (-1.82)	-0.00012* (-1.32)	-0.0000358*** (-4.08)
(Median income)^2	0.0000000012* (1.31)	0.0000000012* (1.36)	0.0000000011 (1.03)	N/A
Coal-burning utilities	12.37 (1.65)	12.43* (1.68)	3.52 (0.44)	13.53* (1.80)
Coal-burning industries	-0.172** (-2.02)	-0.174** (-2.08)	-0.19* (-1.98)	-0.178** (-2.08)
Distance to quality coal	-0.0002*** (-2.74)	-0.0002*** (-3.15)	-0.0003*** (-3.10)	-0.0002*** (-2.65)
Temperature	-0.014** (-1.86)	-0.014** (-2.19)	-0.018** (-2.20)	-0.012* (-1.61)
Coastal	0.384*** (3.39)	0.393*** (3.66)	0.301*** (2.39)	0.363*** (3.21)
PSD parkland	0.087** (2.39)	0.086*** (2.41)	0.145*** (3.99)	0.078** (2.16)
Constant	4.18** (2.34)	4.27** (2.46)	4.11** (2.03)	1.96*** (3.49)
Turning Point For Medinc	$56,980	$56,910	$54,770	N/A
# of obs	48	48	48	48
Prob F	0.0000	0.000	0.0000	0.0000
R^2	0.7033	0.7028	0.6085	0.6896
Adj. R^2	0.6232	0.6324	0.5158	0.6161
Root MSE	0.26074	0.25754	0.29556	0.26318

T-statistics in parenthesis

***significant at 1% level, **significant at 5% level, *significant at 10% level, for a one-tailed test (except for Coal-burning utilities and Coal-burning industries, where a two-tailed test is used)

The variable measuring average LCV scores of elected officials is significant and correctly signed in only one of the three possible regressions, specifically the regression which excludes Sierra Club. For this specification, a one standard deviation rise in the

revised LCV score prompts a 0.13 increase in the likelihood of adopting a stricter SO_2 standard. Although this variable is not significant in the other two regressions, it is important to note that each coefficient does have the expected positive sign. The weak results in the specifications that include Sierra Club as an independent variable may be due to the correlation between these variables (0.55).

The inverted-U hypothesis is tested in the first three specifications, and produces significant results in two of these. Median income is significant and correctly signed in all four of the specifications, including the regression that omits its squared value. Median income-squared produces similar results, and is significant and correctly signed in each specification except for the one excluding the Sierra Club variable. These results support the hypothesized quadratic relationship between income and standards (standards are worsened at low levels of income growth and strengthened at higher levels).

However, the average peak value of median income (beyond which standards would begin to increase in stringency) is around $56,000, nearly $1,000 above the maximum value for state median income. This high value suggests that, although a quadratic relationship exists, the potential for pollution rises more rapidly than the demand for a clean environment at these income levels.

Polluter influence. The independent variables measuring the importance of industrial concerns in legislative decision-making display interesting results as well. The variable that represents the prevalence of coal-burning utilities within a state is significant in two of the specifications, and marginally significant in a third (.107). A one standard deviation rise in the amount of per capita energy produced from coal results in a 0.9 increase in the likelihood a state will adopt a stricter SO_2 standard. In interpreting these

results, it is important to note that all of the coefficients are consistently signed (positive). This supports the hypothesis that greater amounts of polluting energy generation will spur consumer opposition to the extent that reactionary policies are developed to address the pollution.

The variable that measures the industrial strength of other pollution sources displays the opposite results. The coefficients on the coal-burning industry variables are consistently negative in sign, and are significant in all four of the specifications. A one standard deviation rise in the percent of the state labor force belonging to polluting industries results in a 0.9 decline in the probability a state will adopt a stricter SO_2 standard. This suggests that the alternative scenario is at work for private polluting firms, where the industrial lobby is sufficiently strong to curb further increases in environmental regulations beyond the federal requirements.

Distance to high quality (low sulfur content) coal is significantly negative in all of the regressions. A one standard deviation rise in the distance to a high quality coal source will lead to an average decrease of 0.15 in the likelihood that a state will adopt a sulfur dioxide standard stricter than NAAQS. These results provide evidence to support the hypothesis that states farther away from a high quality coal source are less likely to set stricter SO_2 standards. Better access to high quality coal will decrease industrial opposition to stricter environmental policies, as the cost of complying with these regulations goes down.

Geographic characteristics. The variables added to control for geographical differences across states also performed well in each of the specifications. Temperature is significantly negative in all four of the regressions. A one standard deviation rise in

temperature results in an average drop in the dependent variable by 0.12. The consistently negative coefficients support the hypothesis that industrial opposition to stricter environmental standards increases as unfavorable climate conditions inflate the cost of compliance.

The coastal dummy is significantly positive in all of the specifications, consistent with the theory that the cost of complying with stricter regulations is lower in coastal states relative to their inland neighbors. Moreover, the probability of adopting stricter SO_2 standards is 0.36 higher in coastal states.

The prevalence of mandatory Class I PSD regions, measured as the percent of the state that is taken up by national parklands, has consistently positive and highly significant coefficients in all of the specifications. A one standard deviation rise in PSD parklands is estimated to increase the probability by 0.14 that a state will enact stricter regulations than those mandated under NAAQS. These results support the hypothesis that a state with a greater percentage of Class I regions is more likely to set stricter SO_2 standards, as more stringent PSD regulations already apply within the state.

Results of Three Separate SO_2 Standards

The results from the alternative specification of the dependent variable, separating it according to the three distinct standards for SO_2 (annual mean, 24-hour average, and 3-hour average) are available for review in Table 4-9. The predicted signs for the coefficients are now reversed since larger values of the dependent variable correspond to weaker standards.

Table 4-9: Regression Results for Three Separate SO_2 Standards

Variable	Annual Standard	24-hour Standard	3-hour Standard
Sierra Club	-0.010* (-1.60)	-0.069*** (-2.70)	-0.365*** (-2.57)
LCV score	0.00000312 (0.10)	-0.0000762 (-0.57)	-0.00098* (-1.31)
Median income	0.000000995 (1.13)	0.00000787** (2.12)	-0.00000438 (-0.21)
(Median income)^2	-0.0000000000078 (-0.75)	-0.000000000072** (-1.64)	0.00000000011 (0.44)
Coal-burning utilities	-0.106 (-1.26)	-0.182 (-0.51)	-2.75 (-1.39)
Coal-burning industries	0.001 (1.42)	0.006 (1.42)	0.014 (0.61)
Distance to quality coal	0.000000762 (0.75)	0.00000565* (1.31)	0.00007*** (2.95)
Temperature	0.00014** (1.71)	0.0049* (1.42)	-0.00032 (-0.17)
Coastal	-0.0027** (-2.08)	-0.013*** (-2.40)	-0.067** (-2.24)
PSD parkland	-0.00074** (-1.81)	-0.009*** (-4.99)	0.019 (2.00)
Constant	-0.004 (-0.19)	-0.074 (-0.88)	0.557 (1.18)
Turning Point for Medinc	$63,950	$54,960	$20,660
# of states deviating from NAAQS	8	9	6
# of obs	48	48	48
Prob F	0.0044	0.0000	0.0095
R^2	0.4460	0.7191	0.4364
Adj. R^2	0.3216	0.6431	0.2841
Root MSE	0.00293	0.01235	0.06896

T-statistics in parenthesis

***significant at 1% level, **significant at 5% level, *significant at 10% level, for a one-tailed test (except for Coal-burning utilities and Coal-burning industries, where a two-tailed test is used)

These regressions are less successful overall than the linear probability regressions just discussed, but still provide some interesting results. The 24-hour standard achieves the best results, with an R^2 of 0.72 and an adjusted R^2 of 0.64. However, this is not surprising since it also possesses the greatest degree of variation among states (a total of nine deviate from the federal standard).

Sierra Club membership and the coastal dummy are the best performing explanatory variables, as they provide significant and correctly signed coefficients in each of the regressions. PSD parklands, temperature, and distance to high quality coal provide similar confirmation of the theory in two out of the three specifications. The average adjusted LCV score of elected officials is significant and correctly signed only for the 3-hour standard. Finally, the inverted-U hypothesis is supported in the 24-hour standard, but not for the other two specifications.

It is not surprising that the results are not as conclusive as those offered by the aggregate specifications, as separating the dependent variable in this way limits the number of states that deviate from the national standards, and therefore provides less variation to be explained in the model. However, these results appear to generally confirm those of the earlier specification, as the signs on these variables are consistent with the previous results. In particular, the 24-hour standard provides conclusive results to support the Peltzman model, similar to those offered by the aggregate specifications of the dependent variable.

Conclusions

The results from an empirical analysis of state-level sulfur dioxide standards provide evidence to support the Peltzman model of legislator vote maximization. The decision to adopt SO_2 standards stricter than NAAQS is proven to be highly responsive to environmental organizations and industrial interests, as well as other geographic factors that affect the cost of compliance. These results are consistent with the idea that legislators trade-off the interests of consumer groups and industrial polluters when setting an environmental agenda.

The first question posed in this paper is the following: Do legislators select the standards favored by consumer groups, or the more relaxed standards preferred by the industrial polluters? The most active explanatory variable measuring this trade-off is Sierra Club membership, where a one standard deviation rise in the percent of the population belonging to the organization results in an average increase of 0.23 in the likelihood a state will adopt a stricter SO_2 standard. Although the adjusted LCV scores of elected officials offers less convincing results, it is significantly positive in a third of the regressions, and is correctly signed in all but one of these.

The industrial variables, including energy generation from coal sources, labor force participation in major polluting firms, and availability of high quality coal, provide a more complicated view of legislative decision-making. First, stricter sulfur dioxide standards are set for states that rely more heavily on coal-burning electricity generation, i.e., consumer concerns are more salient to legislators than are the interests of these polluting utilities. Since these energy-generating firms represent government sanctioned natural monopolies, they will produce energy regardless of environmental regulations. For this reason, they are less likely to feel threatened and lobby against potential increases in environmental stringency.

The variable that measures industrial strength of other primary pollution sources displays the opposite effect. Although the coefficients for coal burning industries are significant only in the aggregate specifications, the signs on all of the coefficients suggest that private industrial forces lobby effectively against further restrictions on firm activities. Since these interests do not have the monopoly power that energy producers

possess, they are more threatened by state regulations that raise their production costs relative to competitors' costs in other states.

Finally, the distance to a high quality coal source is highly significant in all but one of the specifications, and is consistently signed in all of them. This supports the hypothesis that as the distance to a low sulfur coal source increases, the cost of complying with SO_2 regulations goes up as well. This will lead to greater opposition from industry to stricter environmental standards, making a legislator less likely to adopt the stricter regulations.

Do relatively poorer states react differently to changes in income levels when setting an environmental agenda? Limited confirmation of the inverted-U hypothesis is provided by the current analysis, as all but one of the specifications have coefficients with the predicted signs, and half of these coefficients are significant. The average peak in this relationship (after which further increases in income will result in stricter environmental regulations) is above the maximum observation for median income, suggesting that the potential for pollution rises faster than the demand for environmental quality at current U.S. income levels.

Do states take advantage of favorable location and climate conditions by setting stricter standards? This paper provides evidence that states set stricter standards when geographic characteristics are beneficial to pollution control and weaker standards when these same conditions increase the cost of compliance. The most important explanatory variable controlling for natural variations across states is the coastal dummy, where the probability of adopting stricter SO_2 standards is 0.36 higher in coastal states.

Evidence also shows that higher temperature levels, which inflate the cost of complying with strict SO_2 regulations, are associated with less restrictive policies.

Finally, a state with a higher percentage of land belonging to Class I mandatory Prevention of Significant Deterioration regions are more likely to set stricter standards, as more stringent federal regulations already apply within the majority of the state.

In conclusion, the considerable degree of variance in states adopting stricter sulfur dioxide air quality standards provides an excellent laboratory for the study of comparative state environmental politics. The decision by a state to enact strict or weak environmental standards appears to follow the Peltzman model, as the strength of consumer and producer groups, as well as the natural differences in the cost of compliance across states, all have some effect on the outcome of sulfur dioxide standards.

Notes

1. The Prevention of Significant Deterioration regulations for attainment regions are grouped into three classes, which differ in the amount of polluting growth that is allowed to occur in the area. The mandatory Class I regions include national parks, wilderness areas, national memorial parks, and international parks. The Class I areas allow only a minimal amount of deterioration and therefore provide little room for industrial growth, while more development and some degradation of the existing air quality is permitted in Class II areas. Class III areas are afforded the greatest amount of polluting growth, and ambient air conditions in these regions are allowed to degrade down to the NAAQS levels. Most PSD regions, except for the mandatory Class I areas cited above, can be reclassified with EPA approval. Nonattainment Area (NAA) provisions are much stricter than the PSD regulations, as priority is given to improve degraded ambient air quality, not just to maintain existing quality levels.

CHAPTER 5
THE POLITICS OF SPECIAL INTEREST VOTER SCORECARDS

Introduction

Recent media attention has sparked debate over the use of scorecards by special interest groups to "expose" the voting records of political candidates. These voter guides typically assign a percentage score to elected officials based on their voting records on a set of pre-determined issues of importance to the interest group. The scores range from zero to 100, with a score of 100 signifying perfect agreement between the desires of the group and the politician's voting record.

The tax-exempt status of many of these special interest groups legally precludes their involvement in partisan politics. The Federal Election Campaign Act requires groups that actively participate in elections to register as political committees, subject to both taxation and federal disclosure laws. In order for these "public interest" organizations to maintain their tax exemption, involvement in campaigns and partisan politics cannot be their primary objective. Under the FEC rules, voter guides are perfectly legal as long the main purpose is to educate voters, and not to advocate on behalf of a particular political party.

Although these groups defend the voting indices as neutral issue-based evaluations, an examination of the votes included in the 1997, 1998, 2000, and 2001 scorecards for the Christian Coalition (CC) and the League of Conservation Voters (LCV) provides evidence to the contrary. The data suggest that both groups manipulate voting records in

order to display contrast between the two parties; i.e., partisan non-issue votes are included that inflate the scores of the party that supports the group, while decreasing the scores of the other party. In addition to loading the scorecards with non-issue votes, the Christian Coalition further influences the final scores by deviating from the common practice of counting missing votes (absences) as a vote against the organization. The methodology applied by the Christian Coalition varies across years, but overwhelmingly favors Republican Party members.

These two groups were chosen as the focus of the current analysis for a number of reasons. First, scrutiny by the media and other sources has specifically targeted the scorecards for the League of Conservation Voters and the Christian Coalition as promoting disguised partisanship. [See, for example, Simpson (1996), Hunt (1996, 1998), Cathey (2002), and Strassel (2002)]. A preliminary content analysis of the votes included in the scorecards appears to confirm these accusations.

Also, the separation of issue and non-issue votes for the Christian Coalition and the League of Conservation Voters is facilitated by their emphasis on relatively narrow interests, specifically that of religious values and the environment. Many other special interest scorecards are not so narrowly defined, such as the AFL-CIO (pro-labor), the Chamber of Commerce (pro-business), or the ACLU (pro-civil liberties). For these indices, it is more difficult to determine whether the included votes are relevant or peripheral to the goals of the organization.

Finally, a content analysis of other narrow issue groups such as the National Organization of Women, Planned Parenthood, the National Right to Life Committee, and the National Education Association, among others, did not provide similar evidence of

partisan bias. This would appear to suggest that the media has correctly identified the scorecards that suffer from some partisan bias.

The sample of scorecards to be analyzed includes those for 1997, 1998, 2000, and 2001. Although, LCV scorecards from 1979 to present are publicly available online, the Christian Coalition is not as amiable in providing archived data – only the current scorecard (2001) is available through their website. I was able to locate the additional years (1997, 1998, and 2000) with the help of *Americans United for Separation of Church and State*, a group opposing the Coalition platform. In order to facilitate a comparison of the LCV and the Christian Coalition, I analyze only the four years for which I have data from both organizations.

The results show that once these scorecards are revised to exclude non-issue votes and to correct for methodological inconsistencies, legislators perform better on opposing indices and worse on supporting indices. That is, Democrats fare better on Christian Coalition scorecards and worse on LCV scorecards, and vice versa for Republicans.

Furthermore, the correlation between the scorecards and a simple liberal-conservative index, such as that published by the ADA, decreases as peripheral votes are excluded, as does the correlation between the scores and party affiliation. This diminished correlation with party and liberalism offers empirical support for the hypothesis that the unadjusted scorecards are reflecting some partisanship and not merely congressional voting in an environmental or religious dimension.

Theory and Implications

Literature Review

The potential for bias within special interest scorecard ratings has been examined in the political science literature, including research by Fowler (1982). In her analysis, she focuses on the selection of issues that are rated by groups as the root cause of bias in the indices, and specifically examines the selection process of several major interest groups in order to test the accuracy and consistency of their scorecards. She concludes that group emphasis on a specific set of salient votes has the tendency to bias the scorecards toward only a few issues, presenting a polarized and misleading view of congressional politics. A later work by Snyder (1992) reinforces this potential for bias by pointing out that the special interest ratings emphasize close roll call votes (at the expense of other less partisan issue votes), which leads to an exaggeration in the degree of extremism of the rated legislators.

Another line of research addresses the variability of issue selection over time, and the degree to which this affects intertemporal and interchamber comparisons of interest group ratings. For example, the issues selected by the ADA to measure liberalism in 1980 are not the same types of issues selected for these purposes in 1990 or 2000. This variability across time periods in the ADA selection process will make accurate and unbiased comparisons of these scores impossible. A number of works have tried to circumvent this problem by creating measures to eliminate the time-dependent selection bias. [See, for example, Groseclose, Levitt, and Syder (1999); Shipan and Lowry (2001)].

However, the current literature does not address either the incentive that special interest groups have to manipulate these scores or the degree to which this manipulation favors a certain political party. The main contribution of this paper is to extend the literature by examining whether the inclusion of peripheral votes in issue-specific scorecards can be shown to provide evidence supporting the hypothesis of interest group bias. The incentive to misreport candidate behavior in favor of the group's preferred party is examined within a standard voting model that addresses the decision by a group member of whether or not to vote in the current election.

Theoretical Model

The theoretical model proposed here draws from a number of works in the economics and political science literature, namely Riker and Ordeshook (1968), Filer and Kenny (1980), Uhlaner (1989), and Morton (1991). An individual will vote as long as the expected benefit received from doing so is greater than the costs associated with it.

Formally, an individual will vote only if:

(1) $\Delta p*B+D>C$

where Δp is the probability of affecting the outcome, B is the benefit to the voter if the preferred official is elected rather than the opponent, D is a consumptive benefit or taste for voting (a feeling of civic duty would be included here), and C is the utility cost of voting. An increase in the perceived benefit from voting (LHS of equation) will draw greater political activism. Similarly, a fall in the cost of voting will lead to a rise in participation.

In addition to spurring donations and campaign assistance, voter scorecards are designed to increase voter turnout in favor of preferred candidates. For example, by

prepackaging and identifying the candidates that best represent the group ideology, they effectively decrease the need for information gathering on the part of the voter (lowering the cost of voting). Following the model above, a decrease in the cost of acquiring political information should lead to an increase in the voter turnout among group members, since these are the voters most likely to receive and care about the scorecards. This in turn benefits the group by increasing the probability that its preferred candidates win.

Another means by which special interest groups attempt to achieve a favorable outcome is through changes in the perceived benefit of voting. A leader can appeal to the group on ideological grounds, raising B in equation (1) and increasing the likelihood group members will vote for the supported candidate. For example, the LCV could solicit electoral support from members through their published voter guides by painting a picture of looming environmental catastrophe; similarly, the Christian Coalition could appeal to church members on a moral basis. However the group targets its members, appeals such as these create a sense of loyalty and urgency for the cause.

Also, as evidenced in the growing literature on group voting, the probability of affecting the outcome (Δp) increases with group participation. As long as the group is sufficiently large relative to the electorate, coordinated group action will raise the probability of winning. Uhlaner pointed to the strength of the union vote in the 1982 election as supportive of the group model, and noted "leaders can use the group's communications resources to mobilize members to vote" (392). Voting aids, such as scorecards, are an integral part of this process.

Bayesian updating

It is also useful to analyze changes to the perceived benefit (or utility of voting) in a Bayesian framework where voters continually update their beliefs with new information. [See, for example, Husted, Kenny, and Morton (1995)]. This updated information is generally associated with reductions in voter error in rating a candidate on ideological grounds. In the context of this paper, the new information provided by the voter scorecards is mixed with prior beliefs about a candidate's position, typically improving the group member's ability to evaluate candidate behavior.

Assume that an LCV group member at election time has an expectation of a Democratic candidate's policy position (LCV^{E}_{D}) equal to a weighted average of her prior beliefs (LCV^{Prior}_{D}) and those reported in the scorecards ($LCV^{Reported}_{D}$):

$$LCV^{E}_{D} = \alpha(LCV^{Reported}_{D}) + (1-\alpha)(LCV^{Prior}_{D}), \text{ where } \alpha>0.$$

The member's final estimate on the position of candidates (and therefore the voting decision) will depend not only on the prior and reported estimates, but also on the degree to which she regards the special interest rating as reliable (α). As such, if the group member places greater emphasis on the LCV ratings relative to her own prior knowledge about a candidate, she will modify her estimate more.

The group member's voting decision hinges on the perceived stakes in the outcome, and is represented by the difference in the expected utility she receives if the favored candidate wins versus the utility she receives if the opposed candidate wins. For LCV group members, the absolute difference in utility (B) can be represented by $|LCV^{E}_{D} - LCV^{E}_{R}|$. A larger value of B reflects higher stakes in the outcome, and will increase the likelihood that a group member will vote. Thus, information that widens the distance

between the two perceived platforms will lead to greater participation by group members and increase the probability that the group-favored candidate wins the election.

Social welfare implications

Do these scorecards make society better off by reducing voter error? If the reported LCV scores are a close approximation of the actual behavior of a candidate on environmental issues ($LCV^{Reported}_{O} = LCV^{Actual}_{D}$), then voter expectation becomes closer to the actual candidate position. Therefore, if the scorecards are truthful representations of candidate behavior, the new information will reduce voter error on judging the actual positions of candidates.

However, if the scorecard reports are not representative of actual candidate behavior ($LCV^{Reported}_{D} \neq LCV^{Actual}_{D}$), then the situation is more complicated. Voter error may rise only if the reported LCV score moves the voter in a direction opposite the true position or if the updated estimate overstates the actual position of a candidate. For example, prior LCV scores, actual LCV candidate positioning, and group reported LCV scores are represented on the lines below. Case 1 shows that voter error will increase if the reported LCV and the actual LCV scores are on opposite sides of a voter's prior beliefs. This will cause the group member to update the estimate of a candidate's position in the wrong direction, leading to a greater error in judgment.

CASE 1

$LCV_{Reported}$ LCV_{Prior} LCV_{Actual}

However, in Case 2, voter error will decrease relative to the prior belief as long as the updated estimate remains to the right of the actual candidate position. Only if the new information moves a voter to the left of the actual candidate position will voter error

begin to rise. However, the new error may be smaller than the initial error, depending on the magnitude of the position shift.

CASE 2

$LCV_{Reported}$ LCV_{Actual} LCV_{Prior}

Dimensionality of issue-specific scorecards

A final theoretical consideration that will be addressed in this paper is whether the special interest voter scorecards provide a multi-dimensional evaluation of political behavior. It is assumed that elected officials can be easily rated along a single dimension by liberal-conservative indices. Special interest groups argue that their scorecards provide further information beyond these ideological ratings, i.e. that candidate behavior and activity can also be measured on a multi-dimensional issue-based spectrum. However, the inclusion of non-issue liberal-conservative votes narrows the dimensionality of the different assessments of candidate behavior. Their similarity to existing liberal-conservative indices increases and they provide less novel information to the voter.

League of Conservation Voters

The primary mission of the League of Conservation Voters, founded in 1970, is to represent the environmental movement by exposing the voting records of anti-environmental candidates. In pursuit of their goal to create an environmentally conscious political machine, the LCV publishes an annual scorecard that evaluates candidates on a series of "environmental" roll call votes. Four recent LCV scorecards for the U.S. Congress are examined to test whether the group unfairly favors Democrats.

In order to address the question of partisan bias, a revised index is constructed for each environmental scorecard based on the results from both content and factor analyses. If the scores are biased by the inclusion of peripheral votes, deleting them from the index should have a positive effect on Republican scores and a negative effect on Democrat scores. The extent to which these scores change should provide a measurement of the degree to which the LCV scorecards are biased in favor of Democratic candidates.

Also, the correlation between the scores and other liberal-conservative indices such as that produced by the Americans for Democratic Action (ADA) should decrease with the deletion of superfluous liberal-conservative votes, as should the correlation between the scores and party affiliation. This would support the hypothesis that a pure environmental index provides information in addition to the already existing liberal-conservative indices. The more partisan bias that exists within the LCV score, the more likely that it will produce results similar to a one-dimensional ideological rating.

The 2001 LCV Votes

The fourteen congressional votes included in the 2001 LCV scorecard represent votes from the first half of the 107th Congress and a summary of each environmental issue is provided in Table 5-1. This scorecard published votes on a wide range of environmental topics such as energy efficiency, land conservation, and program budgets. However, the index also rated congressmen on controversial non-environmental initiatives such as abortion and trade. In an attempt to reduce the partisan bias in the scorecard, the revised LCV index excludes these two non-issue votes from the total score calculation.

Table 5-1: 2001 LCV Scorecard Votes

Bill Name	Environmental Issue
1. Arctic Drilling I 8/1/01 (Roll call vote #316, approved 228-201) *NO is pro-LCV vote*	Amendment to Energy bill limiting the size of drilling in the Arctic Refuge to 2,000 acres
2. Arctic Drilling II 8/1/01 (Roll call vote #317, rejected 206-223) *YES is pro-LCV vote*	Amendment to strike the Arctic drilling provision from the Energy bill
3. Hardrock Mining 6/21/01 (Roll call vote #182, approved 216-194) *YES is pro-LCV vote*	Amendment to block efforts to weaken newly issued environmental regulations for the mining industry
4. Monuments Drilling 6/21/01 (Roll call vote #180, approved 242-173) *YES is pro-LCV vote*	Amendment to ban energy exploration on national monuments
5. Gulf Drilling 6/21/01 (Roll call vote #181, approved 247-164) *YES is pro-LCV vote*	Amendment to delay oil and gas leasing off the Florida coastline
6. Great Lakes Drilling 6/28/01 (Roll call vote #203, approved 265-157) *YES is pro-LCV vote*	Amendment to postpone new oil and gas drilling in the Great Lakes region
7. Farm Conservation 10/4/01 (Roll call vote #366, rejected 200-226) *YES is pro-LCV vote*	Amendment to Farm bill providing $5.4 billion a year to land conservation programs
8. Arsenic 7/27/01 (Roll call vote #288, approved 218-189) *YES is pro-LCV vote*	Amendment to EPA funding bill prohibiting the EPA from delaying or weakening the new arsenic standard
9. EPA Enforcement 7/27/01 (Roll call vote #289, rejected 182-214) *YES is pro-LCV vote*	Amendment to restore EPA enforcement funding
10. Fuel Economy 8/1/01 (Roll call vote #311, rejected 160-269) *YES is pro-LCV vote*	Amendment to increase fuel economy standards for light trucks and SUV's
11. National Energy Policy 8/2/01 (Roll call vote #320, approved 240-189) *NO is pro-LCV vote*	House Energy bill which included key points from the Bush energy plan
12. Energy Efficiency 6/21/01 (Roll call vote #178, rejected 153-262) *YES is pro-LCV vote*	Amendment to increase funding for energy conservation programs
*13. International Family Planning 5/16/01 (Roll call vote #115, approved 218-210) *NO is pro-LCV vote*	Amendment to remove language reversing restrictions on funding foreign organizations that provide abortion services
*14. Fast Track Trade Authority 12/6/01 (Roll call vote #481, approved 215-214) *NO is pro-LCV vote*	Fast Track Authority bill granting the president the ability to directly negotiate trade agreements

*Votes excluded from revised LCV scorecard (No factor analysis revised scorecard available)

Content analysis. Voting records regarding the use of public lands and resources constitute 43% of the overall LCV score. The first of these issues include two amendments to the energy bill opening the Artic refuge to oil and gas exploration. The first amendment was a Republican proposal to implement a 2,000-acre limit on the area open for development (vote 1). Environmentalists saw this proposal as deceptive, as certain exemptions to the "limitation" would allow environmental damage equal to that of

the initial legislation. The second amendment was a bipartisan proposal to strike the drilling provision entirely from the energy bill and continue the ban on Arctic Drilling (vote 2).

A third vote concerns the attempt by the Interior Secretary to roll back newly imposed environmental regulations on the mining industry (vote 3). Environmentalists supported these updated standards as a significant improvement to the previous industry regulations, which provided better clean up, allowed the Bureau of Land Management to deny permits on the basis of potential environmental effects, and required mining companies to pay cleanup costs.

Another LCV vote (vote 4) pertains to energy exploration at national monument sites. This amendment to the 2002 Interior Appropriations bill proposed prohibiting the leasing of any national monument land for energy exploration purposes, including the twenty-two controversial new monuments created by the Clinton administration.

The fifth and sixth votes included in the congressional ranking concern oil and gas leasing programs in the Gulf of Mexico (vote 5) and the Great Lakes region (vote 6). Environmentalists fought hard to postpone drilling, which would irreparably damage these coastal environments.

An amendment to the farm bill is included in the scorecard as well. This initiative would have increased funding to $5.4 billion a year for a program offering financial incentives to farmers that engage in land preservation efforts (vote 7).

The vote on an amendment to the EPA funding bill intended to safeguard stricter arsenic standards is also included in the scorecard. The Bush administration hoped to rescind the more stringent 10ppb standard instituted by the Clinton regime to the previous

standard set in 1945 of 50ppb (vote 8), arguing that the new rule was not based on sound science.

A vote concerning the funding of EPA enforcement efforts is included in the LCV rating. The proposed amendment to restore EPA enforcement funding (vote 9) was a reaction to the Bush administration's efforts to cut the program by $25 million and redistribute the money to state agencies in the form of grants. Environmentalists objected to the decrease in funding, claiming that it would limit the ability of the EPA to oversee important environmental laws.

Votes on the issues of energy use and global warming also appear on the scorecard. The first of these was a failed attempt to increase fuel economy standards for light trucks and SUV's. The proposed amendment to the energy bill (vote 10) would have closed the "light truck loophole" by requiring these vehicles to match the current 27.5 miles per gallon standard for regular cars by the year 2007.

Also making its way into the scorecard is President Bush's highly criticized national energy policy (vote 11), which was seen as promoting fossil fuel development at the expense of cleaner energy sources. The vote on H.R. 4 is included in the LCV scorecard, since it contained key features of the Bush energy plan. Also, an amendment to the Interior Appropriations bill that would have shifted funding from fossil fuel development to energy conservation programs (vote 12) is included in the LCV score as well. Promoting energy efficiency and renewable energy sources is at the heart of the debate on global warming.

A content analysis of the 2001 LCV index suggests that the last two votes on Family Planning and Fast Track Authority should be excluded from the revised LCV scorecard.

Not only are these two votes largely peripheral to the environmentalist platform, but their polarization along party lines (nearly 90% of Republicans and Democrats voted with their party on these issues) will exacerbate liberal bias in the final scoring. For these reasons, their exclusion is necessary in order to get an accurate view of legislator responsiveness to environmental concerns.

The first of these excluded votes concerns a motion to strike an amendment overturning the Bush administration's restrictions on international family planning organizations (vote 13). The policy banning the use of U.S. funds to support foreign organizations that provided or supported legal abortion services prompted a hot partisan debate, pitting conservatives and liberals against each other over the issue of abortion rights. Although the environmental effects of overpopulation are a serious concern, the major focus of this piece of legislation was abortion rights. Therefore, this vote is considered peripheral to the environmental cause and should be excluded from a non-partisan environmental rating.

Another quasi-environmental vote that will be deleted is presidential Fast Track Authority (vote 14). The Fast Track Authority bill enabled the President to directly negotiate trade agreements without amendment by Congress, which was allowed only an up-down vote on the agreement. Environmentalists felt that such broad authority did not provide adequate environmental safeguards. Although certain aspects of this vote were seen as disagreeable to environmentalists, voting procedures are not central to the environmentalist platform, and this vote is therefore excluded from the revised scorecard. These last two votes were subjectively chosen as inconsistent with the major objectives

of environmentalism, and excluded from the index to provide a more accurate examination of legislator policy towards environmental issues.

Factor Analysis. A more systematic method of eliminating unrelated scores, such as factor analysis, is also helpful in testing for partisanship. The results from a factor analysis of the 2001 LCV scorecard votes do not separate out into recognizable different dimensions (such as environmental versus ideological). Unfortunately, this lack of consistency between the factor analysis and the subjective exclusions described above will make conclusions regarding the liberal bias of the 2001 LCV scores more difficult, as there is no rigorous method applied to exclude the non-issue votes.

Therefore, the revised 2001 LCV scorecard consists of the core environmental issues (one through twelve), which include land management and conservation, environmental standards and EPA funding, and energy and global warming issues. The omitted votes on international family planning and trade policy are largely non-environmental party-line issues. If the addition of peripheral votes creates bias within the index, then the revised scores should provide a better view of a candidate's environmental agenda.

Other LCV Scorecards

A summary of the votes included in the 1997, 1998, and 2000 LCV scorecards is provided in Tables 5-2 through 5-4. The 1998 scorecard is not revised to reduce partisan bias, as both content and factor analyses of these issues suggest that all of the included roll call votes are primary environmental issues. However, this is not the case with the

Table 5-2: 1997 LCV Scorecard Votes

Bill Name	Environmental Issue
1. Endangered Species Act Flood Waivers 5/7/97 (Roll call vote #108, approved 227-196) *YES is pro-LCV vote*	Amendment to narrow the proposed exemption to the Endangered Species Act for flood damage relief purposes
2. Logging Roads Subsidies 7/10/97 (Roll call vote #262, approved 211-209) *NO is pro-LCV vote*	Amendment to reduce proposed cuts in Forest Service subsidies to timber companies for new logging roads
3. Property Rights 10/22/97 (Roll call vote #519, approved 248-178) *NO is the pro-LCV vote*	Bill to weaken existing regulations regarding land use protections by allowing developers to sue in federal court
4. Grazing I 10/30/97 (Roll call vote #549, approved 242-182) *NO is the pro-LCV vote*	"Forage Improvement Act" - bill to revise federal grazing policies, including the increase of grazing fees
5. Grazing II 10/30/97 (Roll call vote #546, rejected 205-219) *YES is pro-LCV vote*	Amendment that would increase grazing fees on federal lands to equal the appropriate state grazing fee
6. National Wildlife Refuges 9/23/97 (Roll call vote #424, approved 419-1) *YES is pro-LCV vote*	Bill to establish fish and wildlife conservation as the basic mission for all national wildlife refuges
7. National Monuments 10/7/97 (Roll call vote #495, approved 229-197) *NO is pro-LCV vote*	Bill to weaken presidential authority over the designation of natural monument sites
8 World Heritage Sites and Biosphere Reserves 10/8/97 (Roll call vote #504, approved 236-191) *NO is pro-LCV vote*	Bill to restrict U.S. participation in UNESCO World Heritage and Biosphere programs
9. Sugar Subsidy 7/24/97 (Roll call vote #312, rejected 175-253) *YES is pro-LCV vote*	Amendment to restrict USDA loans to sugar producers
10. Animas-La Plata Irrigation Project 7/25/97 (Roll call vote #328, approved 223-201) *NO is pro-LCV vote*	Substitute amendment to limit funding of the Animas-La Plata Irrigation project under certain criteria
11. Clean Coal Technology Program 7/11/97 (Roll call vote #264, rejected 173-243) *YES is pro-LCV vote*	Amendment to cut $292 million in funding from the "clean coal" program
12. Texas Low-Level Radioactive Waste Disposal Compact 10/7/97 (Roll call vote #497, approved 309-107) *NO is pro-LCV vote*	Bill to approve the transport and disposal of low-level radioactive wastes from Vermont and Maine to a facility in west Texas
13. Nevada Nuclear Waste Dump 10/30/97 (Roll call vote #557, approved 307-120) *NO is pro-LCV vote*	Bill to allow an interim nuclear waste dump to be situated near the proposed permanent repository at Yucca Mountain
14. Air Quality Standards 7/97 (197 sponsors) *NO is pro-LCV vote*	Sponsorship of a bill to roll back new EPA standards for ozone and particulate matter
*15. International Family Planning I 2/13/97 (Roll call vote #22, approved 220-209) *YES is pro-LCV vote*	Resolution to release blocked funding to international family planning organizations
*16. International Family Planning II 9/4/97 (Roll call vote #326, rejected 210-218) *YES is pro-LCV vote*	Substitute amendment that would distinguish between international family planning organizations that use funds to prevent or promote abortion

*Votes excluded from revised LCV scorecard (identical to factor analysis revised scorecard)

Table 5-3: 1998 LCV Scorecard Votes

Bill Name	Environmental Issue
1. Land Use Protections 3/12/98 (Roll call vote #52, approved 230-180) *NO is pro-LCV vote*	Bill to allow polluters to challenge long-settled federal environmental safeguards in appellate courts
2. Logging in National Forests 3/27/98 (Roll call vote #80, rejected 181-201) *NO is pro-LCV vote*	Bill to allow the Forest Service to increase commercial logging within national forests for "recovery" purposes
3. Roadless Areas in Forests 3/27/98 (Roll call vote #79, approved 200-187) *YES is pro-LCV vote*	An amendment to exempt roadless areas of national forests from development and "recovery" projects
4. Alaska Logging Roads 7/23/98 (Roll call vote #329, rejected 186-237) *YES is pro-LCV vote*	Amendment to prohibit the use of funds to construct new roads in the Tongass National Forest
5. Alaska Wildlife Area Road 8/18/98 (Roll call vote #, rejected 176-249) *YES is pro-LCV vote*	Amendment to prevent easement for a commercial road through the Chugach National Forest
6. Gulf of Mexico Fisheries Management 8/5/98 (Roll call vote #395, rejected 141-283) *NO is pro-LCV vote*	Substitute amendment to grant state authority over Gulf fishing waters within three to nine miles from shore, nullifying federal bycatch standards for these areas
7. Anti-Environment Riders I 5/19/98 (Roll call vote #157, rejected 190-221) *YES is pro-LCV vote*	Amendment to create a new point of order against bills that weaken or roll back environmental regulations
8. Anti-Environment Riders II 7/23/98 (Roll call vote #334, rejected 176-243) *YES is pro-LCV vote*	Amendment to override all anti-environment riders attached to EPA spending bill
9. Health and Safety Protections 5/19/98 (Roll call vote #160, approved 279-132) *NO is pro-LCV vote*	Bill to establisb new point of order against environmental legislation imposing private sector costs of more than $100 million
10. Energy Efficiency Program Funding 7/21/98 (Roll call vote #313, rejected 212-213) *YES is pro-LCV vote*	Amendment to reduce funding for energy efficiency programs by $25 million
11. Global Warming Gag Rule 7/23/98 (Roll call vote #332, approved 226-198) *YES is pro-LCV vote*	Amendment to override language prohibiting educational activities regarding global warming before Kyoto treaty was approved by the Senate
12. Environmental Reporting and Information 3/26/98 (Roll call vote #74, approved 267-140) *NO is pro-LCV vote*	Bill to waive civil penalties for first-time violations of reporting requirements mandated by certain environmental regulations
13. Tropical Forest Conservation 3/19/98 (Roll call vote #63, approved 356-61) *YES is pro-LCV vote*	Bill authorizing $325 million over three years to restructure debt in developing countries in exchange for land conservation efforts

*No revised LCV scorecard for 1998

Table 5-4: 2000 LCV Scorecard Votes

Bill Name	Environmental Issue
1. Land Conservation Funding 5/11/00 (Roll call vote #179, approved 315-102) *YES is pro-LCV vote*	Bill that would permanently fund the Land and Water Conservation Fund
2. National Monuments 6/15/00 (Roll call vote #280, rejected 187-234) *NO is pro-LCV vote*	Substitute amendment to maintain language prohibiting the use of funds for national monuments created since 1999
3. Utah Wilderness 6/7/00 (Roll call vote #240, rejected 210-214) *NO is pro-LCV vote*	Substitute amendment that would authorize the Bureau of Land Management to decide whether off-road vehicles would be allowed on certain Utah wilderness lands
4. Columbia Basin Land Management 6/15/00 (Roll call vote #279, rejected 206-221) *NO is pro-LCV vote*	Substitute amendment to maintain language requiring that the Colombia Basin plan not adversely impact small businesses
5. Timber Sale Subsidies 6/14/00 (Roll call vote #277, rejected 173-249) *YES is pro-LCV vote*	Amendment to divert funds from the subsidization of timber sales to fish and wildlife protection programs
6. Wild Predator Control 7/11/00 (Roll call vote #382, rejected 190-228) *YES is pro-LCV vote*	Amendment to prevent federal funding of lethal predator control programs
7. Clean Water 6/21/00 (Roll call vote #304, rejected 208-216) *YES is pro-LCV vote*	Amendment to remove provisions from a spending bill that would prohibit the EPA from enforcing the current arsenic standard
8. Air Right to Know 6/21/00 (Roll call 305, approved 225-199) *NO is pro-LCV vote*	Amendment to prohibit the EPA from identifying areas that failed to meet a newly developed ozone standard
9. Superfund Exemption 9/26/00 (Roll call vote #494, approved 253-161) *NO is pro-LCV vote*	Bill to lessen small businesses liability for toxic wastes and Superfund sites
10. Nuclear Waste 3/22/00 (Roll call vote #63, approved 253-167) *NO is pro-LCV vote*	Bill to allow transport of nuclear waste to Yucca Mountain before completion of the permanent facility
11. Delaware River Dredging 6/27/00 (Roll call vote #338, rejected 176-249) *YES is pro-LCV vote*	Amendment to restrict funding for the Delaware River dredging project
12. Property Rights 3/16/00 (Roll call vote #55, approved 226-182) *NO is pro-LCV vote*	Bill to allow developers the right to sue directly in federal court, bypassing local planning officials and land use procedures
13. Global Climate Change 6/26/00 (Roll call vote #323, approved 217-181) *YES is pro-LCV vote*	Amendment to approve funding of already exiting global warming programs
*14. International Family Planning 7/13/00 (Roll call vote #396, rejected 206-221) *YES is pro-LCV vote*	Motion to strike restrictions on funding of international family planning organizations that provide abortion services

*Vote excluded from revised LCV scorecard (No factor analysis revised scorecard available)

1997 and 2000 scorecards, which both include at least one vote on international family planning, discussed earlier in detail. A revised scorecard is constructed for both years to exclude this peripheral issue (two deletions out of 16 for the 1997 scorecard and one exclusion out of 14 for the 2000 scorecard).

A factor analysis of the roll call votes from these two years was also conducted in order to more rigorously test for a separate non-environmental dimension. A factor analysis of the 1997 roll call votes supports the deletion of family planning from the scorecard when three factors are defined (these results are available below in Table 5-5). However, a factor analysis of the votes included in the 2000 scorecard does not provide similar confirmation of the subjective revisions.

Table 5-5: 1997 LCV Votes–VARIMAX Rotated Common Factor (3)

Variables	Factor 1	Factor 2	Factor 3	Uniqueness
Flood waivers	0.77235	0.13809	0.33376	0.27301
Logging Roads	0.63516	0.35295	0.34939	0.34993
Property Rights	0.73928	0.13472	0.37473	0.29489
Grazing I	0.81589	0.10876	0.28077	0.24367
Grazing II	0.72485	0.32207	0.24748	0.30962
National Wildlife Refuges	0.00158	-0.18441	0.08198	0.95927
National Monuments	0.84014	-0.02694	0.32120	0.19027
World Heritage and Biosphere Reserves	0.77546	-0.05375	0.42770	0.21285
Sugar Subsidy	0.08156	0.51586	0.06395	0.72315
Irrigation Project	0.39286	0.43102	0.19584	0.62153
Clean Coal Technology	0.05504	0.48832	0.10232	0.74804
Texas Waste Disposal	0.44346	0.19188	0.14619	0.74516
Air Quality	0.45012	0.30552	0.37599	0.56268
International Family Planning I	0.41986	0.05571	0.85063	0.09703
International Family Planning II	0.40570	0.07414	0.85691	0.09561

Therefore, the LCV scores for 1997, 2000, and 2001 are revised to exclude partisan bias by dropping the non-environmental votes on family planning and fast track based on a content analysis of the indices. A factor analysis confirms the deletion of the two family planning votes in the 1997 scorecard, but does not offer similar evidence for the 2001 or 2000 scorecard years.

Christian Coalition

"How would Jesus vote?" This is presumably the question that the Christian Coalition, founded in 1989 by Robert Reed and evangelist Pat Robertson, seeks to answer with its guides. Although the self-purported goal of the Coalition is to support candidates

with a "moral" or "pro-family" agenda, it is not difficult to see that this often corresponds to the Republican agenda. In fact, the group has openly supported Republican platforms and initiatives, and has defended charges from the Federal Election Commission for violating numerous election laws in support of the GOP. In order to account for potential Republican bias in the Christian Coalition voter guides, a series of revised scorecards are constructed that exclude peripheral non-issue votes such as taxation and campaign finance reform.

The 2001 CC Votes

The twelve congressional votes included in the 2001 Christian Coalition scorecard represent votes from the 107th Congress, and a summary of each is provided in Table 5-6. Two revised indices are constructed for this scorecard in order to correct for partisan bias in the Christian Coalition scoring. The first index is based on a subjective content analysis of the votes included in the CC scorecard, while the second utilizes factor analysis to separate the votes into distinguishable categories.

Content analysis. Abortion and other related issues are a topic of great importance to the religious right and are represented four times in the scorecard (votes 1-4), 33% of the overall score. The first of these votes is an amendment that removes language reversing President Bush's restrictions on funding international family planning organizations that provide abortion services, counseling or advocacy (also 2001 LCV vote 13). A second bill made it a criminal offense to transport a minor over state lines without parental consent in order to obtain an abortion. The last two votes deal specifically with the legal status of the unborn fetus, making it a criminal offense to harm a fetus during the

commission of a violent crime, or to engage in human cloning experiments for any reason.

Table 5-6: 2001 Christian Coalition Scorecard Votes

Bill Name	Moral Issue
1. Human Cloning 7/31/01 (Roll call vote #304, approved 265-162) *YES is pro-CC vote*	Amendment to Title 18 of the U.S. Code prohibiting human cloning
2. Abortion Restrictions 4/17/02 (Roll call vote # 97, approved 260-161) *YES is pro-CC vote*	Amendment to Title 18 of the U.S. Code prohibiting the transport of minors across state lines to circumvent laws requiring the involvement of parents in abortion decisions.
3. International Family Planning 5/16/01 (Roll call vote # 115, approved 218-210) *YES is pro-CC vote*	Amendment to remove language reversing restrictions on funding foreign organizations that provide abortion services
4. Unborn Victims of Violence 4/26/01 (Roll call vote #89, approved 252-172) *YES is pro-CC vote*	Amendment to Title 18 of the U.S. Code and the Uniform Code of Military Justice protecting the unborn fetus from assault and murder
5. Domestic Partners Benefits 9/25/01 (Roll call vote #352, rejected 194-226) *YES is pro-CC vote*	Amendment to prohibit the funding of the District of Columbia Domestic Partnership Act
6. School Vouchers 5/23/01 (Roll call vote #135, rejected 155-273) *YES is pro-CC vote*	Amendment to Education bill providing federal funding for certain students to attend private (including religious) schools
7. Faith-Based Community Solutions 7/19/01 (Roll call vote #254, approved 233-198) *YES is pro-CC vote*	Bill providing incentives for charitable contributions and extending federal funding to faith-based community organizations
8. Marriage Penalty and Family Tax Relief 3/29/01 (Roll call vote #75, approved 282-144) *YES is pro-CC vote*	Amendment to the Internal Revenue Code reducing taxes for married couples and increasing tax credits for children
*9. Income Tax Reduction 3/8/01 (Roll call vote #45, approved 230-198) *YES is pro-CC vote*	Amendment to the Internal Revenue Code reducing individual income tax rates
*10. Death Tax Elimination 4/4/01 (Roll call vote #84, approved 274-154) *YES is pro-CC vote*	Amendment to the Internal Revenue Code phasing out estate and gift taxes
*11. Campaign Finance Reform I 2/13/02 (Roll call vote #22, rejected 188-237) *YES is pro-CC vote*	Amendment to Campaign Finance Bill providing First Amendment protection, including the right to free speech
*12. Campaign Finance Reform II 2/14/02 (Roll call vote #34, approved 240-189) *NO is pro-CC vote*	Bill banning all soft money contributions and imposing restrictions on issue advocacy communications

*Votes excluded from revised CC scorecard (additional votes 6-8 excluded from factor analysis revised scorecard)

One education initiative (vote 6) was included in the scorecard tally dealing with the issue of school vouchers. This failed amendment to an education bill would have

provided federal funding for certain students to attend private (including religious) schools of their choice and was widely popular with religious organizations nationwide.

Social policy supported by the Christian Coalition surfaces twice in the scorecard, making up 17% of the overall score (votes 5 and 7). The first of these includes an amendment that was rejected seeking to prohibit funding of the District of Colombia Domestic Partnership Act, which would extend health benefits to the unmarried domestic partners of Washington DC employees. The second concerns a vote promoting religious organizations, allowing them to compete equally with other non-governmental groups for federal funds in providing social services. It also aids fundraising efforts by providing $13.3 billion in tax breaks for charitable giving over 10 years.

Taxes are represented almost as much as abortion in the scorecard, making up 25% of the total score (votes 8-10). A tax issue that is somewhat related to the Christian cause is a vote to reduce the marriage penalty. The bill allows married couples to claim a standard deduction twice that of single filers and it increases the threshold for low-income couples qualifying for the earned-income tax credit. The law also doubles the tax credit for children younger than 17 to $1,000. The religious right supported this law because it offers financial incentives in favor of "traditional" family values.

However, two non-issue tax votes are also included in the scorecard – namely, income and death taxes. These proposed amendments to the IRS Code, the first reducing individual income tax rates and the latter phasing out estate and gift taxes, share little commonality with the moral issues generally supported by the religious right. Therefore, while the marriage and family tax bill is retained in the revised index, the income and death tax votes are omitted as peripheral partisan issues.

The last issue targeted by the scorecard is that of campaign finance reform (votes 11 and 12). The final vote on this legislation (vote 11) bans soft money contributions to national political parties, while permitting up to $10,000 in soft money contributions to state and local parties to aid voter participation drives. The legislation also stops issue ads from targeting specific candidates within 30 days of the primary or 60 days of the general election. Vote 12 is a proposed amendment to the campaign law that would guarantee First Amendment protection, such as the right to free speech, under the new legislation.

The Christian Coalition has come out against reforming the electoral process, as it will limit their ability to support preferred candidates. However, while this issue makes up 17% of the overall score, it does not provide any information regarding the candidate's views on traditional family values or morality. This vote is instead a partisan issue concerning the political power of well-funded organizations.

In conclusion, based on a subjective analysis of the CC scorecard content, a revised index for the Christian Coalition is constructed without the votes concerning Campaign Finance Reform (11 and 12) and the Income and Death Tax (9 and 10). This leaves the index with eight votes, including the issues of cloning and abortion, education, social policy, marriage incentives, and support for religious organizations. Each vote now constitutes nearly 13% of the total score, instead of the 8% provided by the previous index. The scorecard is re-constructed in this way in an attempt to eliminate the partisan bias that exists within the original index.

Factor analysis. A factor analysis of the Christian Coalition votes is utilized in order to apply more systematic criteria for eliminating unrelated votes. The results provided in Table 5-7 separate the Coalition votes into two distinct dimensions – money and social

issues. Specifically, factor one includes all abortion issues along with the gay rights initiative, while the second factor includes all the tax and campaign finance reforms, as well as school vouchers and funding for religious organizations.

Table 5-7: 2001 Christian Coalition Votes–VARIMAX Rotated Common Factor (2)

Variables	Factor 1	Factor 2	Uniqueness
Human Cloning Ban	0.79569	0.37721	0.22458
Abortion Restrictions	0.79818	0.39015	0.21069
Foreign Aid/Abortion	0.77217	0.44667	0.20424
Unborn Victims of Violence	0.82125	0.38493	0.17738
Domestic Partners Benefits	0.62709	0.56812	0.28400
School Vouchers	0.39290	0.64720	0.42676
Funding for Religious Organizations	0.46140	0.79597	0.15354
Marriage Tax	0.39262	0.68176	0.38105
Income Tax	0.41042	0.83721	0.13063
Death Tax	0.38986	0.70460	0.35155
Campaign Finance Reform	0.47793	0.68662	0.30013
Campaign Finance Reform	0.47237	0.74374	0.22373

The division of the Christian Coalition votes by factor analysis goes beyond the subjective method described above, as the earlier revision includes the fiscal initiatives that can be reasonably linked to Christian values. Since the factor analysis provides a more rigorous determination of the extent of partisan bias in the Christian Coalition scores, both revised indices will be employed to test for Republican favor by the organization. More specifically, factor analysis suggests deleting all but the abortion and gay rights issues (votes 1-5). The corresponding qualitative assessment of the scorecard is less restrictive as it also includes the votes regarding the marriage tax, school vouchers, and religious agency funding (votes 5-8).

Christian Coalition Methodology

A final issue of concern regarding the Christian Coalition voter guides is the methodology applied in calculating the scores. The 2001 index used a consistent technique to report votes for and against the designated platform, i.e., a positive score for

a favorable vote and a negative score for an unfavorable vote. However, when a congressman was absent (and therefore did not vote on this issue) varying methods were employed in calculating that missing vote. The common methodology for treating missing votes is to count them negatively in the overall score, as is done in the ADA and LCV indices.

For example, Representative Cubin (R) from Wyoming voted on only eight of the twelve issues (positive on all), but received a 100% score from the Christian Coalition. Representative Traficant (D) from Ohio voted on nine out of twelve votes (positive on all but one), but received a 67% on the CC rating. In the case of Representative Cubin, the missing votes either counted positively or were excluded from the scoring, whereas with Representative Traficant, his absence most certainly counted against him. If his score had been calculated in the same manner as his Republican colleague, he would have received either an 89% or a 92% (depending on whether you dropped the missing votes or counted them as positives).

Table 5-8 provides a look at the scores for congressmen who were absent for at least one of the 2001 Christian Coalition votes. Three different possible reporting methods are provided for calculating the score: the missing vote is calculated as a vote against the platform (Neg Absent Vote), calculated as a vote in favor of the platform (Pos Absent Vote), or excluded from the final score calculation (Exclude Absent Vote). The scores under those procedures are listed along with the actual score given to the representative by the Christian Coalition.

Table 5-8: Christian Coalition Methodology in Reporting Absent Votes in 2001

	Party	Neg Absent Vote	Pos Absent Vote	Exclude Absent Vote	CC score
Stark (CA)	D	0	8	0	0
Becerra (CA)	D	0	8	0	0
Roybal-Allard (CA)	D	0	8	0	0
Meek (FL)	D	0	8	0	0
Visclosky (IN)	D	0	8	0	0
Rothman (NJ)	D	0	8	0	0
Ackerman (NY)	D	0	8	0	0
Meeks (NY)	D	0	8	0	0
Owens (NY)	D	0	8	0	0
Velazquez (NY)	D	0	8	0	0
Serrano (NY)	D	0	8	0	0
Kennedy (RI)	D	0	8	0	0
Baldwin (WI)	D	0	8	0	0
Hastings (FL)	D	0	17	0	0
Rush (IL)	D	0	17	0	0
McKinney (GA)	D	8	17	9	8
Dingell (MI)	D	8	17	9	8
Towns (NY)	D	8	17	9	8
Rangel (NY)	D	8	17	9	8
Engel (NY)	D	8	17	9	8
Lampson (TX)	D	8	17	9	8
Clyburn (SC)	D	17	25	18	17
Tanner (TN)	D	42	50	45	42
John (LA)	D	58	67	64	58
Peterson (MN)	D	58	67	64	58
Skelton (MO)	D	58	67	64	58
Clement (TN)	D	58	67	64	58
Traficant (OH)	D	67	92	89	67
Lipinski (IL)	D	75	83	82	75
Shows (MS)	D	83	92	91	83
Leach (IA)	R	42	50	45	42
Forbes (VA)*	R	50	83	75	100
Roukema	R	58	67	64	58
LaTourette (OH)	R	67	75	73	67
Ros-Lebtinen (FL)*	R	67	83	80	58
Cubin (WY)	R	67	100	100	100
Bereuter (NE)	R	75	83	82	75
Wilson (SC)*	R	81	100	100	75
Smith (NJ)	R	83	92	91	83
Dunn (WA)	R	83	92	91	92
Riley (AL)	R	83	100	100	100
Brady (TX)	R	83	100	100	100
Hefley (CO)	R	92	100	100	100
Latham (IA)	R	92	100	100	100
Cooksey (LA)	R	92	100	100	100

Table 5-8 contd.: Christian Coalition Methodology in Reporting Absent Votes in 2001

	Party	Neg Absent Vote	Pos Absent Vote	Exclude Absent Vote	CC score
Ballenger (NC)	R	92	100	100	100
Thornberry (TX)	R	92	100	100	100

*None of the three possible scoring methods correspond to score assigned by the Christian Coalition

Definitions:
Neg Absent Vote: CC score if absentee votes are calculated as negative votes
Pos Absent Vote: CC score if absentee votes are calculated as positive votes
Exclude Absent Vote: CC score if absentee votes are excluded from the score calculation
CC Score: Actual score reported by the Christian Coalition

Table 5-9 shows these results separated out by party. If the absent congressman was a Democrat, the missing value was always counted as a negative vote.[13] The scores of thirty Democratic congressmen were affected in this way. In contrast, when the absent official was a Republican, which occurred in the case of fourteen congressmen, the missing votes were counted as a positive vote 64% of the time[14] (a vote in favor of the Christian Coalition). Deviation from the common methodology of counting missing votes as a negative resulted in a net gain of 116 points for 9 Republicans, an average of 13 points per representative, while Democrat scores were unaffected.[15]

Table 5-9: Absentee calculations by the Christian Coalition in 2001

	Counted as a positive vote	Counted as a negative vote
Democrat	0	30
Republican	9	5

The revised Christian Coalition indices take into account this methodological inconsistency by re-counting each absence as a negative vote, regardless of party affiliation. These methodological changes, along with the exclusion of partisan non-issue

[13] If the Democrat had a prior score of zero, it is possible that the missing vote was actually omitted from the final score calculation.

[14] If the Republican bad a prior score of 100, it is possible that the missing vote was actually omitted from the final score calculation.

[15] The results exclude three Republican representatives whose scores are miscalculated by the Christian Coalition.

votes from the final score (by content and factor analyses), should provide a more accurate measure of a representative's standing on "moral" or "Christian" issues.

Other Christian Coalition Scorecards

A similar examination by content and factor analyses is performed on earlier scorecards to revise them for partisan bias as well. A description of the 1997 votes is provided in Table 5-10. For this CC scorecard, a content analysis suggests the omission of two votes regarding taxes and term limits (votes 8-9). A factor analysis of the 1997 votes provides confirmation of these findings – when three factors are defined, the two peripheral votes load onto a single factor (see Table 5-11). Therefore, only one revised index is constructed for 1997 that represents both the content and factor analyses.

A content analysis of the 1998 scorecard (Table 5-12) suggests only the deletion of a tax limitation amendment (vote 12) as peripheral to Christian values. However, a factor analysis, the results from which are available in Table 5-13, further refines the 1998 scorecard into social and fiscal issues, similar to that provided by the 2001 scorecard analyses. This revision maintains only the four abortion votes and the needle exchange program as central issues, while omitting taxation and funding for education, the arts, and legal services for the poor (votes 6-11).

The revision of the 2000 Christian Coalition scorecard by content analysis (Table 5-14) excludes five non-issue votes, including four tax and campaign finance reform initiatives (votes 12-15). Also excluded is a vote concerning a national missile defense system (vote 11 – oddly enough, the Christian Coalition supported missile proliferation). A factor analysis of these same votes does not provide independent confirmation of the subjective omissions, as the votes for this scorecard do not load well onto distinguishable

factors. For this reason, only one revised index is constructed for the 2000 scorecard that separates the votes by content analysis.

Table 5-10: 1997 Christian Coalition Scorecard Votes

Bill Name	Moral Issue
1. Partial Birth Abortions 3/20/97 (Roll call vote #65, approved 295-136) *YES is pro-CC* vote	Bill to prohibit abortion of a fetus as it is coming through the birth canal
2. International Family Planning 2/13/97 (Roll call vote #22, approved 220-209) *NO is pro-CC vote*	Resolution to send additional foreign aid to overseas organizations that promote or perform abortions
4. Abortions in Military Hospitals 6/19/97 (Roll call vote #217, rejected 196-224) *NO is pro-CC vote*	Amendment to repeal the current law which prohibits U.S. military medical facilities from performing abortions
3. Ten Commandments Display 3/5/97 (Roll call vote #31, approved 295-125) *YES is pro-CC vote*	Motion to express congressional support for public display of the Ten Commandments in government buildings
5. Violent Juvenile Crime 5/8/97 (Roll call vote #118, approved 286-132) *YES is pro-CC vote*	Legislation authorizing $1.5 billion in federal bonuses for states and local authorities to fight juvenile crime
6. National Endowment for the Arts Funding 7/10/97 (Roll call vote #259, approved 217-216) *YES is pro-CC vote*	Resolution allowing for the elimination of taxpayer funding for the National Endowment for the Arts
7. Revoking Most Favored Nation status for China 6/24/97 (Roll call vote #231, rejected 173-259) *YES is pro-CC vote*	Resolution disapproving renewal of Most Favored Nation (MFN) status to China
*8. Term Limits for Congress 2/12/97 (Roll call vote #21, rejected 217-211) *YES is pro-CC vote*	Joint resolution to impose a 12-year lifetime limit on congressional service in both the House and the Senate
*9. Tax Limitation 4/15/97 (Roll call vote # 78, rejected 233-190) *YES is pro-CC vote*	Constitutional amendment which would require a two-thirds majority vote in both the House and the Senate in order to raise taxes

*Votes excluded from revised CC scorecard (identical to factor analysis revised scorecard)

Table 5-11: 1997 Christian Coalition Votes–VARIMAX Rotated Common Factor (3)

Variables	Factor 1	Factor 2	Factor 3	Uniqueness
Partial Birth Abortions	0.57805	-0.26534	-0.59490	0.24155
International Family Planning	0.84780	-0.26653	-0.17763	0.17863
Abortions in Military Hospitals	0.84683	-0.21716	-0.26391	0.16607
Ten Commandments Display	0.49005	-0.33683	-0.57019	0.32128
Violent Juvenile Crime	0.32938	-0.47480	-0.48805	0.42788
NEA Funding	0.60637	-0.55425	-0.22739	0.27342
MFN Status for China	0.10585	0.08795	0.22311	0.93128
Term Limits	0.35810	-0.49660	-0.33191	0.51500
Tax Breaks	0.53448	-0.63350	-0.27983	0.23471

Table 5-12: 1998 Christian Coalition Scorecard Votes

Bill Name	Moral Issue
1. Partial Birth Abortion 10/8/97 (Roll call vote #500, approved 295-133) *YES is pro-CC* vote	Motion to agree to the Senate language to prohibit the abortion of a fetus as it is coming through the birth canal
2. International Family Planning 9/4/97 (Roll call vote #362, rejected 210-218) *NO is pro-CC vote*	Amendment to allow organizations that promote or perform abortions to remain eligible for U.S. international family planning funds
3. Parental Notification for Title X Family Planning Clinics 9/9/97 (Roll call vote #378, approved 220-201) *NO is pro-CC vote*	Substitute amendment denying parents the right to be notified when minor children were provided contraception and abortion referrals through federal Title X family planning clinics
4. Abortions in Military Hospitals 6/19/97 (Roll call vote #217, rejected 196-224) *NO is pro-CC vote*	Amendment to repeal the current law wbich prohibits U.S. military medical facilities from performing abortions
5. Needle Exchange Programs 9/11/97 (Roll call vote #391, approved 266-158) *YES is pro-CC vote*	Amendment to prohibit the use of federal taxpayer funds to carry out or promote any program that distributes needles for illegal drug use
6. Opportunity Scholarships for D.C. Students 10/9/97 (Roll call vote #513, approved 203-202) *YES is pro-CC vote*	FY 98 D.C. Appropriations bill wbich included a scholarship program allowing 2000 eligible low-income students to attend alternative public, private, or parochial schools
7. H.E.L.P. Scholarships 11/4/97 (Roll call vote #569, rejected 191-228) *YES is pro-CC vote*	Bill which would allow states to use federal education funds to provide scholarships to low-income families to send their children to a school of their choice
8. Education Savings Accounts (IRAs) 10/23/97 (Roll call vote #524, approved 230-198) *YES is pro-CC vote*	Bill which would allow tax breaks for parents wbo save money for education expenses (K-12 for public, private, or home school)
9. Prohibit Funding of Federal Tests 2/5/98 (Roll call vote #9, approved 242-174) *YES is pro-CC vote*	Bill prohibiting the use of taxpayer funds for any federally sponsored national tests for elementary or secondary education without first receiving specific and explicit consent from Congress
10. National Endowment for the Arts Funding 7/10/97 (Roll call vote #259, approved 217-216) *YES is pro-CC vote*	Resolution allowing for the elimination of taxpayer funding for the National Endowment for the Arts
11. Legal Services Corporation Funding 9/25/97 (approved 246-176, approved 246-176) *NO is pro-CC vote*	Amendment to increase taxpayer funding for the federally funded Legal Services Corporation
*12. Tax Limitation 4/15/97 (Roll call vote # 78, rejected 233-190) *YES is pro-CC vote*	Constitutional amendment which would require a two-thirds majority vote in both the House and the Senate in order to raise taxes

*Vote excluded from revised CC scorecard (additional votes 6-11 excluded by factor analysis)

Table 5-13: 1998 Christian Coalition Votes–VARIMAX Rotated Common Factor (2)

Variables	Factor 1	Factor 2	Uniqueness
Partial Birth Abortion	0.42679	0.65823	0.38459
International Family Planning	0.39093	0.86329	0.10191
Parental Notification	0.45139	0.76843	0.20576
Abortions in Military Hospitals	0.41411	0.82705	0.14450
Needle Exchange Programs	0.46600	0.6604	0.34720
Opportunity Scholarships	0.85792	0.39658	0.10670
Education IRAs	0.83940	0.38333	0.14847
Federal Tests	0.75875	0.45209	0.21992
NEA Funding	0.84929	0.40648	0.11348
Legal Services Corporation	0.67516	0.46492	0.32801
Tax Breaks	0.69017	0.44072	0.32942

Table 5-14: 2000 Christian Coalition Scorecard Votes

Bill Name	Moral Issue
1. Abortion Restrictions 6/30/99 (Roll call #261, approved 270-159) *Yes is pro-CC vote*	Bill that would make it a federal crime for anyone other than a parent to transport a minor across state lines to seek an abortion
2. International Family Planning 7/29/99 (Roll call vote #349, approved 228-200) *Yes is pro-CC vote*	Amendment to bar U.S. population control funds to foreign organizations that perform abortions
3. Unborn Victims of Violence 9/30/99 (Roll call vote #465, approved 254-172) *Yes is pro-CC vote*	Bill making it a criminal offense to injure or kill a fetus during the commission of a violent crime
4. Needle Exchange Programs 7/29/99 (Roll call vote #344, approved 241-187) *Yes is pro-CC vote*	Amendment to prohibit D.C. from the use of federal, local or other funds for a needle exchange program
5. Traditional Family Adoptions 7/29/99 (Roll call vote #346, rejected 213-215) *Yes is pro-CC vote*	Amendment to bar joint adoptions in D.C. by any couple not related by blood or marriage
6. National Endowment for the Arts Funding 7/14/99 (Roll call vote #287, rejected 124-300) *Yes is pro-CC vote*	Amendment to reduce funding for the NEA by $2.1 million
7. Casino Gambling 7/14/99 (Roll call vote #289, rejected 205-217) *Yes is pro-CC vote*	Amendment to prohibit funding for casino-style gambling on Indian lands except through a tribal-state compact
8. Religious Discrimination in Public Schools 6/17/99 (Roll call vote #223, rejected 210-216) *Yes is pro-CC vote*	Amendment to prohibit the Office of Juvenile Justice from discriminating against the religious beliefs of program participants
9. Religious Liberty Protection 7/15/99 (Roll call vote #299, approved 306-118) *Yes is pro-CC vote*	Bill to prohibit governmental interference with individual religious practices unless the it can prove "compelling state interest"
*10. Straight A's Education Reform 10/21/99 (Roll call vote #532, approved 213-208) *Yes is pro-CC vote*	Bill establishing a pilot program allowing 10 states to develop student performance goals
*11. Anti-Missile Defense 3/18/99 (Roll call vote #59, approved 317-105) *Yes is pro-CC vote*	Bill to declare that it is U.S. policy to deploy a national missile defense system
*12. Tax Limitation 4/15/99 (Roll call vote #90, rejected 229-199) *Yes is pro-CC vote*	Joint resolution to propose a constitutional amendment requiring a two-thirds majority vote in order to increase taxes
*13. Tax Cut Conference Report 8/5/99 (Roll call vote #379, approved 221-206) *Yes is pro-CC vote*	Adoption of the conference report on the bill to reduce taxes by $792 billion
*14. Campaign Finance Reform I 9/14/99 (Roll call vote #422, approved 252-177) *No is pro-CC vote*	Bill banning all contributions of soft money and imposing restrictions on issue advocacy communications
*15. Campaign Finance Reform II 9/14/99 (Roll call vote #413, rejected 189-238) *Yes is pro-CC vote*	Amendment to exempt voter guides from "issue advocacy" regulations

*Votes excluded from revised CC scorecard (No factor analysis revised scorecard available)

Methodology. The tabulation of missing votes or absences is also examined for the earlier years (remember that the commonly accepted practice is to count it as a vote against the cause). However, unlike the 2001 scorecard, missing votes in these indices are consistently deleted from the overall calculation of a congressman's score, independent of party identification. For example, if a Congressman was missing for two out of fourteen possible votes, the two absences would be deleted from the final calculation and the score would be based on the remaining twelve votes.

Although this methodology is applied consistently across parties, the practice works to the overwhelming advantage of Republican congressmen. To illustrate, an equal number of Republicans and Democrats (36 each) were missing for at least one vote of the 2000 scorecard. However, deleting the missing vote in the scorecard (as compared to counting it as a negative) resulted in a 306-point total boost for Republicans (an average of 8.5 points per representative), while the same number of Democrats gained only 60 points (an average of 1.5 points per representative). The results are similar for 1997 and 1998, where Republicans gained an average of 10 to 12 points per representative, while their Democratic colleagues gained an average of 1 to 3.5 points.

Revised scorecards. The earlier Christian Coalition scorecards are revised for partisan bias using the same method applied to the 2001 index. Specifically deleted from the 1997, 1998, and 2000 scorecards are the peripheral partisan issues concerning campaign finance reform, tax cuts, term limits, and missile defense. Also deleted from the 1998 scorecard by means of factor analysis are the funding initiatives for education, the arts, and legal services. The final scores in each of these scorecards are also recalculated to count missing votes (or absences) as a vote against the organization. If

the accusations of Republican bias within the Christian Coalition scorecards are legitimate, revising them in this manner should lead to an overall decrease in the scores of Republicans and an increase in the scores of Democrats.

Results

Summary of the Revised Score Changes

The summary statistics available in Tables 5-15 through 5-21 provide evidence of partisan bias within the scorecards of the League of Conservation Voters and the Christian Coalition. The tables report the results from the scorecard revisions by party, including the original LCV and Coalition scores, the revised scores that exclude non-issue votes using content analysis, and by factor analysis when available (FA in the results). Congressmen registered as independents are excluded from the dataset, as are representatives serving partial terms who did not vote on at least 50% of the issues.

Two versions of these statistics are also available: the first excludes the observations for congressmen with initial perfect scores of zero or one hundred,[16] while the second includes all available observations. The reason behind this distinction is that Congressmen with perfect initial scores will not be affected by any revisions, causing the score changes within the boundaries of zero to one hundred to be underestimated.

The summary statistics for the LCV scorecard revisions are provided in Tables 5-15 and 5-16. Once adjusted for partisan bias and excluding perfect scores, Democrats lose an average of 1.4 points on their LCV score over the three years, while Republicans gain an average of 0.9 points. Including the endpoint observations decreases these effects slightly, with Democrats losing an average of 1.2 points and Republicans gaining an

[16] A number of representatives with initial CC scores of 100 are retained – once corrected for methodological inconsistencies (missing votes), their revised scores were lower than 100.

average of 0.7 points. The largest effects are seen with the 1997 scores of Democrats, who lost an average of 2.4 points when two international family planning initiatives were excluded from the scorecard.

Table 5-15: Summary Statistics for LCV Scorecard Revisions–Democrats

		Without Endpoints			With Endpoints		
Year	Variable	Obs.	Mean	Stand. Dev.	Obs.	Mean	Stand. Dev.
1997	LCV Score	188	66.37	23.90	203	68.85	24.63
	Revised LCV	188	63.98	24.91	203	66.64	25.76
	LCV Difference	188	-2.39	4.41	203	-2.21	4.28
1998	No Change						
2000	LCV Score	191	75.34	20.11	209	77.46	20.43
	Revised LCV	191	74.84	20.06	209	77.01	20.44
	LCV Difference	191	-0.50	2.69	209	-0.45	2.58
2001	LCV Score	154	73.87	21.40	210	80.84	21.66
	Revised LCV	154	72.47	22.63	210	79.81	22.88
	LCV Difference	154	-1.40	3.91	210	-1.02	3.40

Table 5-16: Summary Statistics for LCV Scorecard Revisions–Republicans

		Without Endpoints			With Endpoints		
Year	Variable	Obs.	Mean	Stand. Dev.	Obs.	Mean	Stand. Dev.
1997	LCV Score	222	27.10	21.46	224	27.31	21.99
	Revised LCV	222	28.13	21.40	224	28.33	21.92
	LCV Difference	222	1.03	4.07	224	1.02	4.06
1998	No Change						
2000	LCV Score	175	23.54	21.54	221	18.64	21.42
	Revised LCV	175	24.06	21.51	221	19.12	21.43
	LCV Difference	175	0.51	3.08	221	0.48	2.84
2001	LCV Score	126	29.09	25.00	220	16.66	23.76
	Revised LCV	126	30.23	27.23	220	17.31	25.45
	LCV Difference	126	1.14	4.48	220	0.65	3.43

All of the LCV score changes occur in the predicted direction (positive for Republicans and negative for Democrats). Furthermore, these results are substantiated by a series of difference in means tests and univariate regressions. The first of these tests finds the difference in the mean changes of the two parties for each of the years to be significant at the 5% level. The univariate regression analysis explaining individual LCV

changes using a Democrat dummy variable provides similar results. Table 5-17 shows each of the coefficients to be highly significant, with Democrats affected more negatively than Republicans by an average of 2.3 points in the restricted sample.

Table 5-17: Univariate Regression Results–League of Conservation Voters

	Without Endpoints				With Endpoints			
LCV Difference	1997	1998	2000	2001	1997	1998	2000	2001
Democrat*	-3.42 (-8.15)	No Change	-1.01 (-3.35)	-2.54 (-5.06)	-3.23 (-8.00)	No Change	-0.93 (-3.56)	-1.68 (-5.09)
Constant	1.03 (3.62)		0.514 (2.36)	1.14 (3.07)	1.02 (3.66)		0.48 (2.63)	0.655 (2.84)
# of observations	410		366	280	427		430	430
Prob F	0.0000		0.0009	0.0000	0.0000		0.0004	0.0000
R-squared	0.1400		0.0299	0.0845	0.1309		0.0288	0.0572
Root MSE	4.2283		2.8849	4.1735	4.1659		2.7159	3.4154

*Variable equals zero for Republicans and one for Democrats; T statistics in parenthesis (all coefficients are significant at 1% level)

The summary statistics for the Christian Coalition score revisions are available in Tables 5-18 and 5-19. These changes are greater in absolute value than the LCV differences – Democrats gain an average of 2.3 points over the four years when the scores are readjusted by content analysis, and this average jumps to 16 points for scores revised solely by factor analysis (1998 and 2001).

Table 5-18: Summary Statistics for CC Scorecard Revisions–Democrats

		Without Endpoints			With Endpoints		
Year	Variable	Obs.	Mean	Stand. Dev.	Obs.	Mean	Stand. Dev.
1997	CC Score	170	30.19	22.27	205	25.47	23.61
	Revised CC	170	32.61	22.91	205	27.53	24.67
	CC Difference*	170	2.42	6.92	205	2.06	6.39
1998	CC Score	92	28.27	20.47	201	13.94	21.52
	Revised CC	92	27.73	20.66	201	13.73	21.42
	Revised CC (FA)	92	49.35	33.60	201	23.68	34.24
	CC Difference	92	-0.54	3.74	201	-0.20	2.62
	CC Difference (FA)	92	21.08	18.97	201	9.75	16.57
2000	CC Score	143	26.02	19.93	209	18.28	21.19
	Revised CC	143	27.69	24.34	209	19.43	24.51
	CC Difference	143	1.67	7.64	209	1.14	6.36
2001	CC Score	112	27.83	19.94	210	15.32	20.93
	Revised CC	112	33.42	25.78	210	18.30	25.75
	Revised CC (FA)	112	39.11	36.45	210	21.33	33.41
	CC Difference	112	5.59	9.04	210	2.98	7.16
	CC Difference (FA)	112	11.28	21.56	210	6.01	16.70

Table 5-19: Summary Statistics for CC Scorecard Revisions–Republicans

		Without Endpoints			With Endpoints		
Year	Variable	Obs.	Mean	Stand. Dev.	Obs.	Mean	Stand. Dev.
1997	CC Score	167	79.78	14.56	226	83.94	15.90
	Revised CC	167	76.53	16.08	226	82.21	18.07
	CC Difference*	167	-3.26	8.26	226	-1.73	7.92
1998	CC Score	109	78.90	21.02	223	89.44	18.12
	Revised CC	109	75.21	20.26	223	87.71	18.89
	Revised CC (FA)	109	71.56	32.12	223	86.16	26.51
	CC Difference	109	-3.69	6.99	223	-1.72	5.36
	CC Difference (FA)	109	-6.95	19.38	223	-3.28	13.98
2000	CC Score	149	79.50	18.62	221	85.78	17.85
	Revised CC	149	74.32	19.85	221	83.03	20.12
	CC Difference	149	-4.66	7.95	221	-2.75	7.32
2001	CC Score	92	74.11	20.05	217	89.02	18.27
	Revised CC	92	72.41	22.10	217	88.04	19.79
	Revised CC (FA)	92	70.63	34.89	217	87.10	26.93
	CC Difference	92	-1.70	8.44	217	-0.98	5.97
	CC Difference (FA)	92	-3.46	19.45	217	-1.92	13.18

*The results for 1997 are substantiated by both content and factor analyses

Moreover, Republicans lose an average of 3.3 points on the subjective measure, and an average of 5 points on the factored measure. Although these effects are less striking when the sample includes endpoint observations, all of the score changes occur in the predicted direction, with the exception of a negative change for Democrats in 1998.

The difference in means tests provides empirical support for these results – the difference in the mean changes by party for each year is significant at the 5% level. The univariate regression results in Tables 5-20 and 5-21 further substantiate these findings by attributing the changes in the Christian Coalition scores to party differences, with coefficients that are significant at the 1% level in each specification. According to the regression coefficients, Democrats are more positively affected than Republicans by as much as 28 points when the scorecards are revised to exclude peripheral votes.

Table 5-20: Christian Coalition (Without Endpoints)

CC Difference	1997	1998	1998 (FA)	2000	2001	2001 (FA)
Democrat*	5.68	3.15	28.03	6.34	7.83	15.47
	(6.84)	(3.89)	(10.32)	(6.94)	(6.26)	(5.36)
Constant	-3.26	-3.69	-6.95	-4.66	-2.24	-4.19
	(-5.53)	(-6.77)	(-3.78)	(-7.30)	(-2.44)	(-1.97)
# of observations	337	201	201	292	204	204
Prob F	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
R-squared	0.1226	0.0699	0.3485	0.1424	0.1604	0.1227
Root MSE	7.6121	5.7469	19.19	7.8007	8.9711	20.706

Table 5-21: Christian Coalition (With Endpoints)

CC Difference	1997	1998	1998 (FA)	2000	2001	2001 (FA)
Democrat*	3.78	1.52	13.02	3.89	3.96	7.94
	(5.42)	(3.65)	(8.78)	(5.87)	(6.22)	(5.46)
Constant	-1.72	-1.72	-3.28	-2.75	-2.20	-1.93
	(-3.59)	(-6.01)	(-3.21)	(-5.94)	(-2.20)	(-1.89)
# of observations	431	424	425	430	427	427
Prob F	0.0000	0.0003	0.0000	0.0000	0.0000	0.0000
R-squared	0.0642	0.0305	0.1542	0.0745	0.0835	0.0656
Root MSE	7.2341	4.2285	15.262	6.8695	6.58	15.014

*Variable equals zero for Republicans and one for Democrats; T statistics in parenthesis (all coefficients are significant at the 1% level)

The results from both the Christian Coalition and LCV revisions support the theory that the scores are reflecting some partisanship and not just congressional voting behavior on a religious or environmental dimension. All but two of the 36 possible score changes occur in the predicted direction and the differences are more pronounced when perfect initial scores are excluded. The Christian Coalition scores of both parties are more greatly affected by the revisions than are the corresponding LCV scores. Most notable are the CC differences of 1998 and 2001, where factor analysis separates the "money" issues from the other social policies (abortion, drug use, and homosexuality). For these years, the average Democrat score increased by 21.08 and 11.28 points, and Republican scores dropped by -6.95 and -3.46 points.

Correlation with ADA and Party

The revised CC and LCV scores are less correlated with ADA and party affiliation than are the original group scores. These results, reported in Tables 5-22 and 5-23,

unanimously support the theory that loading the scorecards with non-issue partisan votes narrows the dimensionality of information available from these indices.

Table 5-22: LCV Correlation with ADA and Party

		Without Endpoints		With Endpoints	
Scorecard Year		ADA Score	Party Affiliation	ADA Score	Party Affiliation
1997	LCV Score	0.85	0.66	0.86	0.67
	Revised LCV Score	0.81	0.61	0.83	0.63
1998	No Change				
2000	LCV Score	0.90	0.78	0.91	0.82
	Revised LCV Score	0.88	0.77	0.90	0.81
2001	LCV Score	0.85	0.70	0.91	0.82
	Revised LCV Score	0.80	0.65	0.89	0.79

Table 5-23: Christian Coalition Correlation with ADA and Party

		Without Endpoints		With Endpoints	
Scorecard Year		ADA Score	Party Affiliation	ADA Score	Party Affiliation
1997	CC Score	-0.91	-0.80	-0.92	-0.83
	Revised CC Score	-0.87	-0.74	-0.89	-0.79
1998	CC Score	-0.90	-0.77	-0.95	-0.89
	Revised CC Score	-0.88	-0.76	-0.94	-0.88
	Revised CC Score (FA)	-0.48	-0.32	-0.81	-0.72
2000	CC Score	-0.91	-0.81	-0.95	-0.87
	Revised CC Score	-0.85	-0.73	-0.91	-0.82
2001	CC Score	-0.90	-0.76	-0.96	-0.88
	Revised CC Score	-0.81	-0.63	-0.93	-0.84
	Revised CC Score (FA)	-0.61	-0.41	-0.86	-0.74

The decreasing correlation with party and ADA scores is most pronounced with the Christian Coalition scores: for those indices revised by content analysis, the average correlation with ADA scores declines from -0.90 to -0.85, while the average correlation with party affiliation drops from -0.79 to -0.72. Even more substantial is the decrease in correlation between the original scores and those derived by factor analysis (1998, 2001). For these years, the average correlation with ADA scores drops from -0.90 to -0.55, while the average correlation with party identification declines from -0.79 to -0.37.

Although the effect is smaller for the revised LCV index and for the specifications that include perfect scores, all of the changes result in reduced correlations and are consistent with the theory. The evidence therefore suggests that the biased voter guides provide less novel information, and come closer to reproducing a simple liberal-conservative linear rating of political ideology.

Large Score Changes

The scores of a number of public officials changed significantly on the revised indices. To illustrate this point with the 2001 scorecards, the Christian Coalition scores of thirty-two congressmen changed in excess of 15 points when this index was subjectively revised to reduce partisan favor. With the exception of four Republican congressmen,[17] all of these changes had the expected sign (positive for Democrats, negative for Republicans). Moreover, the scores of eleven congressmen changed by greater than 20 points and all were in the predicted direction.

Most of these large changes can be characterized as improving Democrat positions in the CC rankings. For example, nine Democrats who were initially reported as having poor records on Christian values (21-40%) achieved a more moderate status (41-60%) after the non-issue votes were excluded. Also, another twelve Democrat scores were upgraded from moderate to pro-religious positions (61-80%) after the revisions. A similar comparison can be made for the Republican changes, where three Republicans listed as avid supporters of Christian values in the original reports (81-100%) were downgraded to more moderate pro-religious positions (61-80%) after the revisions.

[17] These Republicans either gained points on the revised CC score, or lost points on the revised LCV score.

The Christian Coalition scores revised by factor analysis provide even larger changes, with jumps as significant as 50 points from the original index. The scores of forty congressmen changed in excess of 30 points when the fiscal issues were excluded from the "pro-family" index. Moreover, except for the case of Rep. Condit, a conservative Democrat from California, all of the changes occurred in the predicted direction.

The absolute changes to 2001 LCV scores are milder than those experienced by the Christian Coalition rankings. The scores of only eleven congressmen were affected by more than 10 points, and no score changed in excess of 12 points. All of these differences had the expected sign (negative for Democrats, positive for Republicans), with the exception of two Republican representatives. The score changes are best characterized as decreasing the percentages of already low scoring Democrats, while at the same time increasing the scores of relatively pro-environment Republicans.

Conclusions

This paper presents evidence of partisan bias in four scorecards for the Christian Coalition and the League of Conservation Voters. Once the voter scorecards are revised to exclude non-issue votes and to correct for methodological inconsistencies, candidate fare better on opposing indices and worse on supporting indices. These groups appear to intentionally distort the voting records of candidates by manipulating the content of the scorecards in order to display greater contrast between the two parties.

The Christian Coalition makes the largest partisan distortions – on average, Democrats gain between 1 and 21 points depending on the year and specification (excluding the small loss experienced in 1998), while Republicans lose between 1 and 7 points. This provides support for the claim that the Christian Coalition has a predisposed bias that

favors the Republican Party, and that this bias is translated into higher Republican scores and lower Democrat scores on their voting guide.

The LCV scorecard is shown to produce a similar slanted rating. Depending on the year and specification, Democrats lose an average of 0.5 to 2.5 points on the LCV index, while Republicans gain between 0.5 and 1 point. Although small by comparison with the Christian Coalition changes, all of these differences follow the predicted direction. It is also important to note that these results, along with those provided by the Christian Coalition, are further substantiated by a series of difference in means tests and univariate regressions.

The correlation between the scorecard and a liberal-conservative index decreases as peripheral votes are excluded, as does the correlation between the scores and party affiliation. This effect is greatest for the Christian Coalition scores – for example, in 1998, the correlation between the revised scores (FA) and the ADA dropped by 47%, and the correlation with party affiliation declined by 58%. These results show that as peripheral votes are added to the scorecard to favor a particular political party, the dimensionality of these ratings decreases.

A final issue addressed in this paper is whether the scorecards make society better off by reducing voter error. The voting model asserts that scorecards inflate voter turnout within the group through decreasing the cost of voting (provision of information) and increasing the benefits associated with voting (sharpening the differences between candidates), where the final estimate of a candidate's position is a weighted average of prior beliefs and scorecard reports. In order to increase voter turnout for a preferred candidate, the special interest group has an incentive to misrepresent candidate behavior

if this will increase the stakes in the outcome, i.e. create an artificial contrast between candidates.

This paper has produced empirical evidence showing that the League of Conservation Voters and the Christian Coalition do in fact engage in such manipulative behavior. However, whether these actions by the interest groups will increase voting errors made by individual members depends on the prior and reported estimates of candidate behavior, along with the degree to which the special interest rating is viewed as reliable. Although some members will be negatively affected by the false information, it is not necessarily the case that the overall welfare of the group will suffer the same fate, i.e. voter error may decline for some members and increase for others. Whether or not the final result of these changes will increase total voter error is beyond the scope of the current work, but is a question deserving further analysis.

CHAPTER 6
SUMMARY AND CONCLUSIONS

State Environmental Regulations

The results from an empirical analysis of state environmental standards for sulfur dioxide and toxic metals provide general support for the Peltzman theoretical model of legislator vote maximization. The decision to adopt strong air and water pollution standards is proven to be responsive to environmental organizations and industrial interests, as well as geographic factors that affect the cost of compliance. Also, these analyses provide limited confirmation of an inverted-U shaped curve linking state income and environmental standards.

The first question posed in this part of the dissertation is the following: Do legislators select the standards favored by consumer groups, or the more relaxed regulations preferred by industrial polluters? In the water quality analysis, the only active participant in policy design from either group is agriculture, where the strength of the farming industry has an overwhelmingly weakening effect on the standards for toxic metals.

However, state responsiveness to the divergent interests of consumer and producer groups is more prevalent in the decision to adopt strict sulfur dioxide standards. The most significant explanatory variable is Sierra Club membership, where a one standard deviation rise in the percent of the population belonging to the organization results in an average 0.23 boost in the probability a state will adopt a stricter SO_2 standard. Although

the adjusted LCV scores of elected officials offers less convincing results, it is significant in a third of the regressions and is correctly signed in all but one of these.

The industrial variables, including energy generation from coal sources, labor force participation in major polluting firms, and availability of low sulfur coal, provide a more complicated view of legislative decision-making. First, stricter sulfur dioxide standards are set for states that rely more heavily on coal-burning electricity generation, implying that consumer concerns are more salient to legislators than are the interests of these polluting utilities.

The variable that measures the strength of other industrial pollution sources displays the opposite effect. Although the coefficients for coal-burning industries are significant only in the aggregate specifications, the signs on all of the coefficients suggest that private industrial forces lobby effectively against further restrictions on firm activities. Since these interests do not have the monopoly power that energy producers possess, they are more threatened by legislation that imposes greater production costs.

Finally, the distance to a low sulfur coal source is significant in all but on of the specifications, and is consistently signed in all of them. This supports the hypothesis that as the distance to a low sulfur coal source increases, the cost of complying with SO_2 regulations goes up as well. This will lead to greater opposition from industry to stricter environmental standards, making a legislator less likely to adopt the stricter regulations.

Do relatively poorer states react differently to changes in income levels when setting an environmental agenda? Limited confirmation of the inverted-U hypothesis is provided by both water and air quality analyses. The inverted-U is supported across the equations in all but one of the water quality specifications. The average peak in this relationship

(after which further increases in income will result in stricter toxic metal standards) occurs at approximately the average state income level. This suggests that states above and below the national average react differently to changes in income levels with regard to the establishment of water quality standards.

Sulfur dioxide standards provide further support for this hypothesis. All but one of the specifications testing the inverted-U have coefficients with the predicted signs, and half of these are significant. However, the average peak in this relationship is above the maximum observation for median income, suggesting a monotonic relationship over the relevant range of income levels. In this scenario, the potential for sulfur dioxide pollution rises faster than the demand for environmental quality at current U.S. income levels.

Do states take advantage of favorable location and climate conditions by setting stricter standards? This dissertation provides evidence that states set weaker standards for both sulfur dioxide and toxic metals where geographic characteristics and climate conditions inflate the cost of compliance for polluting firms. Significant and correctly signed variation is provided by each explanatory variable measuring these natural differences in abatement costs.

In conclusion, the considerable degree of variance in states adopting strict toxic metal water quality standards and sulfur dioxide air quality standards provides an excellent laboratory for the study of comparative state environmental politics. The decision by a state to enact strict or weak environmental standards appears to follow the Peltzman model, as the strength of consumer and producer groups, as well as the natural differences in the cost of compliance across states, all have some effect on the outcome of these standards.

Special Interest Participation

Chapter 5 presents evidence of partisan bias in four scorecards for the Christian Coalition and the League of Conservation Voters. Once the voter scorecards are revised to exclude non-issue votes and to correct for methodological inconsistencies, candidates fare better on opposing indices and worse on supporting indices. These groups appear to intentionally distort the voting records of candidates by manipulating the content of the scorecards in order to display greater contrast between the two parties.

The Christian Coalition makes the largest partisan distortions – on average, Democrats gained between one and 21 points depending on the year and specification (excluding the small loss in 1998). At the same time, Republicans lost an average of one to seven points on their scorecard rating. This provides support for the claim that the Christian Coalition has a predisposed bias that favors the Republican Party, and that this bias is translated into higher Republican scores and lower Democrat scores in their voting guides.

The LCV scorecard is shown to produce a similar slanted rating. Depending on the year and specification, Democrats lose an average of 0.5 to 2.5 points on the LCV index, while Republicans gain between 0.5 and one point. Although small by comparison with the Christian Coalition changes, all of these differences follow the predicted direction. It is also important to note that these results, along with those provided by the Christian Coalition, are further substantiated by a series of difference in means tests and univariate regressions.

The correlation between the scorecard and a liberal-conservative index decreases as peripheral votes are excluded, as does the correlation between the scores and party affiliation. This diminishing correlation is most pronounced with the Christian Coalition

score changes. For example, the correlation between the 1998 scores revised by factor analysis and the ADA dropped by 47%, while the correlation with party affiliation declined by 58%. These results show that as peripheral votes are added to the scorecard to favor a particular political party, the dimensionality of these ratings decreases.

A final issue addressed in the chapter is whether the scorecards make society better off by reducing voter error. The voting model asserts that scorecards inflate voter turnout within the group through decreasing the cost of voting (provision of information) and increasing the benefits associated with voting (sharpening the differences between candidates). The final voter estimate of a candidate's position is a weighted average of her prior beliefs and the published scorecard reports. In order to increase voter turnout for a preferred candidate, the special interest group has an incentive to misrepresent candidate behavior if this will increase the stakes in the outcome, i.e. create an artificial contrast between candidates.

This paper has produced empirical evidence showing that the League of Conservation Voters and the Christian Coalition do in fact engage in such manipulative behavior. However, whether these actions by the interest groups will increase voting errors made by individual members depends on the prior and reported estimates of candidate behavior, along with the degree to which the special interest rating is viewed as reliable. Although some members will be negatively affected by the false information, it is not necessarily the case that the overall welfare of the group will suffer the same fate since voter error may decline for some members and increase for others. Whether or not the final result of these changes will increase total voter error is beyond the scope of the current work, but is a question deserving further analysis.

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BIOGRAPHICAL SKETCH

I was born in a small town in central Florida to a large family, where I was raised and eventually attended high school. During my senior year, I studied abroad in Barcelona, Spain, at Colegio SPEH, but returned to graduate with my high school class in the spring of 1994. I did my undergraduate studies at the University of Miami, where I received a Bachelor of Arts in economics and international studies, with minors in Spanish and French. During my undergraduate career, I studied abroad at both the Universidad de Granada in Spain, and at the American University of Paris in France.

I took one year off between undergraduate and graduate studies, during which time I worked for the U.S. Customs Service as a Customs Inspector at Miami International Airport in Florida. I returned to graduate school the following year to begin the doctoral program in economics at the Warrington College of Business Administration, University of Florida. My dissertation concerns the political behavior of environmental policy decisions, and upon graduation I will be pursuing a one-year master's in biostatistics at Harvard University, with a focus on environmental statistics.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Lawrence W. Kenny, Chair
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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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This dissertation was submitted to the Graduate Faculty of the Department of Economics in the College of Business Administration and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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